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SOFTWOOD TREE VOLUME EQUATIONS FOR MAJOR CALIFORNIA SPECIES

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ABSTRACT

New cubic-foot, International 1/4-inch board-foot, and Scribner board-foot tree volume equations and tables are presented for eight species: Douglas-fir, Jeffrey pine, ponderosa pine, sugar pine, lodgepole pine, white fir, California red fir, and incense-cedar.

KEYWORDS: Cubic-foot volume tables (stand), board-foot stand volume tables.

INTRODUCTION

We have developed, for use in the Forest Survey of California, 1/2 new cubic-foot, International 1/4-inch board-foot, and Scribner board-foot tree volume equations for eight conifer species: Douglas-fir (Pseudotsuga menziesii (Mirb.) Franco), ponderosa pine (Pinus ponderosa Laws.), Jeffrey pine (Pinus jeffreyi Grev. & Balf.), sugar pine (Pinus lambertiana Dougl.), lodgepole pine (Pinus contorta Dougl.), white fir (Abies concolor (Gord. & Glend.) Lindl.), California red fir (Abies magnifica A. Murr.), and incensecedar (Libocedrus decurrens Torr.).

Previously, Forest Survey has relied on a series of local volume tables (California Forest and Range Experiment Station, Forest Survey 1956) to compile timber volume statistics for California. These tables assume average heights and form classes by site class based on Forest Survey data collected in the 1940's. The old tables no longer meet Forest Survey needs because (1) we are now interested in an accurate assessment of the volume on individual plots, for which we need volume estimates that take into account individual tree height variation; (2) height over d.b.h. and form class over d.b.h. ratios based on 25-year-old data may not accurately describe today's forest; and (3) the International 1/4-inch board-foot local volume tables assume a top utilization that does not conform with Forest Survey standards.

To replace the old tables, we needed volume equations that would provide comparable estimates of cubic, International 1/4-inch, and Scribner volume to Forest Survey utilization standards. The only existing tables suitable for statewide use (Clements and others 1949a, 1949b) were available only for the Scribner rule and varied by merchantable log height--a variable that is less desirable than total height for use on permanent plots. We therefore chose to develop our own equations.

THE BASIC DATA

Our need was for volume equations suitable for use on trees throughout California. Ideally, for this purpose, we would have preferred a large sample of recently measured trees, drawn from the complete range of forest conditions found in the State. In practice, we were limited to available tree measurement data, since we had neither time nor funds to undertake our own measurements. The most readily available tree measurement data were assembled by Clements and others (1949a, 1949b) during the preparation of their form class volume tables for ponderosa pine, Douglas-fir, white fir, sugar pine, and red fir. The tables themselves are inadequate for our purposes because they are based on log height rather than total height and because they are developed only for the Scribner log rule. However, complete stem profiles are available for all the 2,110 trees used to develop the tables.

 $[\]frac{1}{2}$ A nationwide project of the U.S. Forest Service. The Pacific Northwest Forest and Range Experiment Station conducts the survey in Alaska, California, Hawaii, Oregon, and Washington.

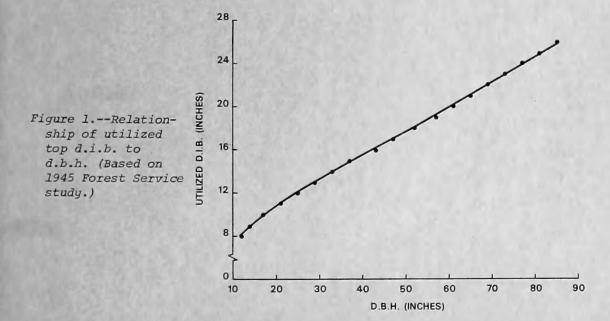
 $[\]frac{2}{}$ Unpublished cubic and International 1/4-inch rule volume tables on file at the Pacific Northwest Forest and Range Experiment Station.

The felled tree measurements used for the form class volume tables were, for the most part, taken 50-70 years ago. Both young- and old-growth trees were included from a range of sites scattered from the Modoc plateau south along the Sierra Nevada to the Sierra National Forest. To this sample, we added 957 dendrometer-measured trees from recent inventories of the Eldorado and Sierra National Forests. The latter trees included small samples of lodgepole pine and incense cedar--two species not included in the form class volume tables.

Although the size of our sample was more than adequate, the reader should be aware of some important data deficiencies. First, two-thirds of the sample was drawn from trees measured many years ago. While we recognized the danger of bias inherent in the use of old data, that risk seemed preferable to relying on a much smaller sample with a limited geographical distribution. Second, we were unable to find measured-tree data from the Coast Ranges or, more important, for trees under 11.0 inches in diameter breast high. In the case of California red fir, all our sample trees were over 14 inches. This lack of small-tree data posed a particular problem in developing cubic-foot equations, since volumes were needed for all trees 5.0 inches and larger. We were forced to extrapolate, using comparisons of existing tables as a guide to reasonableness. Finally, our sample data for lodgepole pine and incense-cedar were limited -- 26 trees of the former species and 46 of the latter -- and confined to the southern Sierra Nevada. In spite of these scanty data, we decided to develop volume equations for both species, as an alternative preferable to using equations developed for some other species.

DEVELOPING THE EQUATIONS

The STX program (Grosenbaugh 1967) was used to calculate three volumes for each of the sample trees: (1) CV_4 --cubic-foot volume to a 4-inch minimum top d.i.b., (2) $IV1/4_{6.5}$ --International 1/4-inch board-foot volume to a 6.5-inch minimum top d.i.b., and (3) SV_u --Scribner board-foot volume to a California utilized top as defined by a 1945 Forest Service study (California Forest and Range Experiment Station, Forest Survey 1956). The relationship of the utilized top d.i.b. to d.b.h. is shown in figure 1.



The method of analysis was essentially that used by Bruce and DeMars (1974). For each species and each log rule, tree volumes were fitted by weighted least squares by means of a stepwise multiple regression analysis. In order to obtain homogeneity of variance, each variable was divided by 0.005454154 (d.b.h.)² (total height)—the volume of a cylinder with a basal area and height equal to that of the sample tree. Our choice of independent variables was limited by the information available about the sample trees. Variables tested included d.b.h., total height, their powers, and cross products. Site class and age class (young growth or old growth) were also tried but dropped because their relative contribution to precision was small and their inclusion in the equations would have required the user to obtain site and age information.

The volume equations follow. Where applicable, restraints have been added to insure reasonable extrapolation. The following symbols have been used:

V = volume

D = diameter breast high

H = total height

F = form factor (the ratio of a tree's volume to that of a cylinder of the same diameter and height)

CF4 = cubic-foot form factor

IF1/46.5 = International 1/4-inch board-foot form factor to a 6.5-inch top d.i.b.

 $SF_u = Scribner form factor (16-foot logs) to a California utilized top. 3/$

To determine the volume of a given tree, first calculate the tree form factor, (transformed volume) using the appropriate equation for the species. Then multiply the form factor by the volume of a cylinder with the same height and basal area as the tree. Thus: $V = 0.005454154 \ D^2H \ F$, where F is equal to the form factor appropriate for the species and log rule. The form factor equations are:

Species	Equation
Douglas-fir	$CF_4 = 0.248569 + 0.0253524 \left(\frac{H}{D}\right) - 0.0000560175 \left(\frac{H^2}{D}\right)$
	IF1/4 _{6.5} (when H \geq 57 feet) = 1.575350 - 1269.84 ($\frac{1}{DH}$)
	+ 20.4816 $(\frac{1}{D})$ + 0.0000135387 H ²

 $[\]frac{3}{}$ See figure 1.

 $[\]frac{4}{}$ For all species except incense-cedar, CF₄ will be set equal to 0.4 whenever the equation value is higher than 0.4. When the equation value for CF₄ is lower than 0.3, it is set equal to 0.3. This will insure reasonable extrapolation beyond the limits of the study data.

IF1/4_{6.5} (when H < 57 feet) = 1.575350 - 1269.84 ($\frac{1}{DH}$) Douglas-fir + 20.4816 $(\frac{1}{D})$ + 0.0000135387 H² + 7333.86 $(\frac{1}{p^2H})$ - 128.342 $(\frac{1}{p^2})$ $SF_{y} = 2.58530 - 83.5000 \left(\frac{1}{H}\right)$ Ponderosa and $CF_4 = 0.402060 - 0.899914 \left(\frac{1}{D}\right)$ Jeffrey pine $IF1/4_{6.5} = 3.02027 - 22.0313 \left(\frac{1}{D}\right) + 0.00201362 \text{ (H)}$ $SF_{11} = 3.22940 - 585.500 \left(\frac{1}{DH}\right) - 21.7575 \left(\frac{1}{D}\right)$ $CF_4 = 0.358550 - 0.488134 \left(\frac{1}{D}\right)$ Sugar pine IF1/4_{6.5} = 2.75889 - 18.1229 $(\frac{1}{D})$ + 0.000225065 $(\frac{H^2}{D})$ $SF_{11} = 2.88706 - 25.2838 \left(\frac{1}{D}\right)$ $CF_4 = 0.422709 - 0.0000612236 \left(\frac{H^2}{D}\right)$ Lodgepole pine $IF1/4_{6.5} = 2.86258 - 716.659 \left(\frac{1}{DH}\right)$ $SF_{ij} = 2.63048 - 850.630 \left(\frac{1}{DH}\right)$ $CF_4 = 0.299039 - 1.91272 \left(\frac{1}{H}\right) + 0.000367217 \left(\frac{H^2}{D}\right)$ White fir IF1/4_{6.5} (when D \geq 11.0 inches) = 2.08637 - 119.839 ($\frac{1}{2}$) + 0.000620285 $(\frac{H^2}{D})$ $IF1/4_{6.5}$ (when D < 11.0 inches) = (0.45 + 0.05 D) (1.09597 $+ 0.000056389 H^2$) $SF_{11} = 2.31733 - 16.9592 \left(\frac{1}{D}\right) + 0.000548156 \left(\frac{H^2}{D}\right)$

 $[\]frac{5}{}$ SF_u will be set equal to 0.7 whenever it drops below this value to insure reasonable extrapolation from small trees. The volume of a tree with a minimum saw log diameter of 8 inches/inside bark by 12 feet long is 23 board feet.

California red fir $CF_4 = 0.231237 + 0.028176 \ (\frac{H}{D})$ $IF1/4_{6.5} = 1.54320 + 0.00133466 \ (\frac{H^2}{D})$ $SF_u = 1.59669 - 464.752 \ (\frac{1}{DH}) + 0.00105105 \ (\frac{H^2}{D})$ $CF_4 = 0.225786 + 4.44236 \ (\frac{1}{H})$ $IF1/4_{6.5} = 1.39269 + 0.0000259631 \ H^2$ $SF_u = 1.82080 - 11.7184 \ (\frac{1}{D})$

Volumes calculated from these equations are in tables 1-21.

RELIABILITY OF THE EQUATIONS

One measure of the reliability of an equation is the extent to which the individual observations deviate from the regression surfaces. A measure of this residual variation is the root mean squared error-the square root of the mean squared difference between the predicted and actual values. Table 22 shows the root mean squared error of each form factor equation, expressed both in absolute terms and as a percent of the average form factor.

It is generally desirable to test new equations against an independent source of data--data not used in the construction of the equations. We tested the equations on 441 trees from the Stanislaus National Forest which had been measured with an optical dendrometer. The results of this test, together with the results of a test of the old Forest Survey local volume tables, appear in table 23. Figures 2-9 illustrate the relationship between estimated and actual volume of the test trees. As expected, the new equations, based on d.b.h. and total height, account for more of the variation in individual tree volume than do the old tables based on d.b.h. alone. The old lodgepole pine and incensecedar tables gave very biased estimates of tree volume in this test. Tests against different trees in other geographic areas might well produce different biases. However, the new equations, which reflect differences in individual tree heights, should carry less risk of bias than the old tables, which rely on assumptions about the average relationships between heights and d.b.h. within a site class.

We also developed a complete set of volume equations which used Girard form class as one of the independent variables. When individual tree, Girard form class is known without error, these equations are more precise than the ones presented here. In practice, however, actual form class is seldom known. A common procedure is to use average form classes by species and sometimes by diameter class. We wondered whether the addition of form class would improve the estimate of individual tree volume when average form class was substituted for actual form class.

 $[\]frac{6}{}$ When the equation value for CF4 is < 0.27, it is set equal to 0.27 to insure reasonable extrapolation.

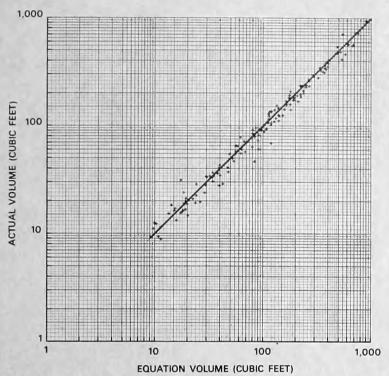


Figure 2.--Relationship between the measured cubicfoot volume of 146 ponderosa and Jeffrey pine trees and estimates from the new equation.

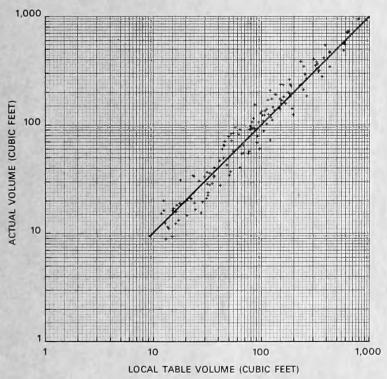


Figure 3.--Relationship between the measured cubicfoot volume of 146 ponderosa and Jeffrey pine trees and estimates from Forest Survey local volume tables.

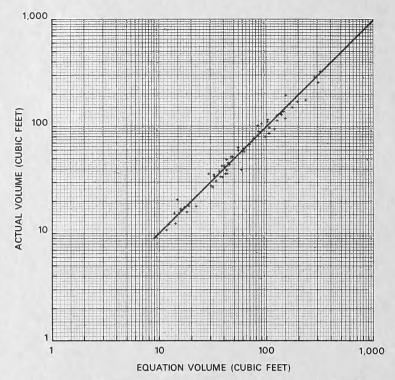


Figure 4.--Relationship between the measured cubicfoot volume of 60 lodgepole pine trees and estimated volume from the new equation.

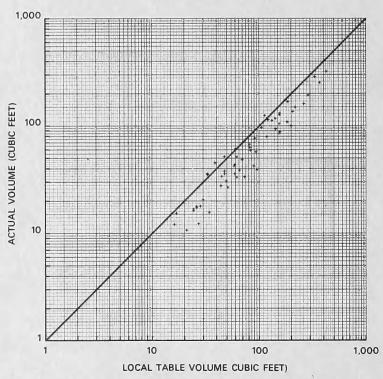


Figure 5.--Relationship between the measured cubicfoot volume of 60 lodgepole pine trees and estimates from the Forest Survey local volume tables.

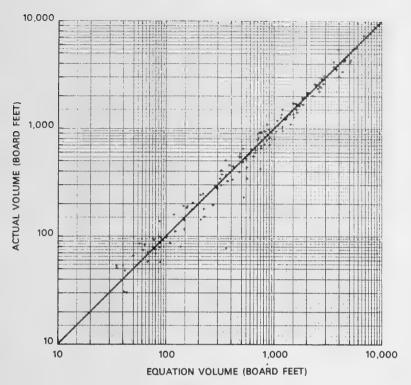


Figure 6.--Relationship between the measured International 1/4-inch board-foot volume of 146 ponderosa and Jeffrey pine trees and estimates from the new equation.

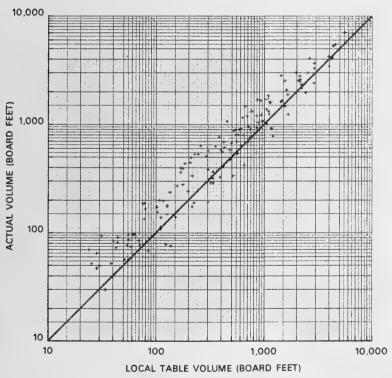


Figure 7.--Relationship between the measured International 1/4-inch board-foot volume of 146 ponderosa and Jeffrey pine trees and estimates from the Forest Survey local volume tables.

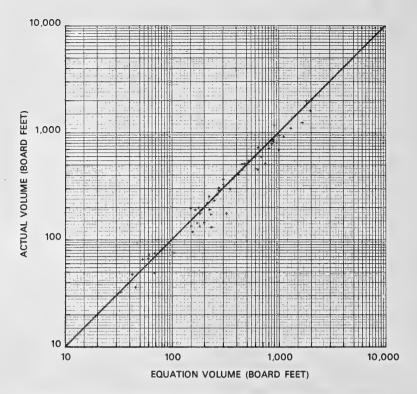


Figure 8.--Relationship between the measured International 1/4-inch board-foot volume of 60 lodgepole pine trees and estimates from the new equation.

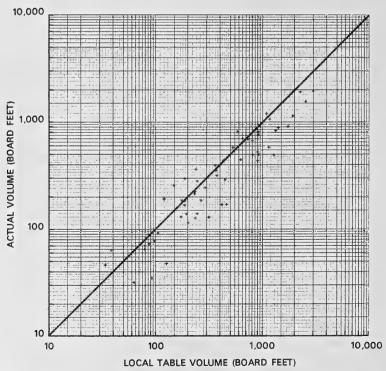


Figure 9.--Relationship between the measured International 1/4-inch board-foot volume of 60 lodgepole pine trees and estimates from the Forest Survey local volume tables.

To answer this question, we tested equations with and without form class against our 441 Stanislaus National Forest trees. The results of this test are in table 24. In this test, the extra precision gained by adding a form class variable was lost completely when average form class was substituted for actual form class, even though the actual average form classes of the test trees were used. We therefore decided not to include the form class equations in this note. We will be glad to supply the form class equations on request. However, we do not recommend their use unless form class is known for every tree.

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	240													405	453	203	955	612	0/9	731	795	861	929	1,000	1,074	1,151	1,232	1,321	1,414	1,510	1,608	1,711	1,816	1,924	2,036	2,150	2,268	2,389	2,313
	230													389	434	483	534	287	643	701	762	825	891	959	1,030	1,104	1,180	1,266	1,355	1,447	1,541	1,639	1,740	1,844	1,951	2,061	2,174	2,290	2,409
	220													372	415	462	510	561	615	671	729	789	852	918	985	1,055	1,129	1,211	1,296	1,384	1,474	1,568	1,665	1,764	1,866	1,971	2,079	2,190	2,304
	210													354	396	044	487	535	586	639	695	753	813	875	940	1,007	1,078	1,156	1,237	1,321	1,407	1,497	1,589	1,684	1,781	1,882	1,985	2,091	2,199
	200													337	376	418	463	605	557	809	661	716	773	832	468	957	1,026	1,101	1,178	1,258	1,340	1,425	1,513	1,604	1,696	1,792	1,890	1,991	7,094
	190								161	188	218	249	283	319	356	396	438	482	528	9/5	626	678	733	789	847	908	975	9,00,1	1,119	1,195	1,273	1,354	1,438	1,523	1,612	1,702	1,796	1,891	066,1
	180								152	177	205	235	267	301	336	374	413	455	498	544	591	049	692	745	800	859	924	991	1,060	1,132	,206	1,283	,362	,443	,527	,613	, 701	,792	,885
	170								142	166	193	221	251	282	316	351	389	428	694	511	556	602	651	701	753	811	872	936	1,000,	,069	,	,212		,363	,442	,523	,607	1,692	,780
	160	13	22	35	20	89	68	111	133	155	180	506	234	797	295	329	364	400	439	479	521	564	610	657	708	763	821	881	942 1				_	1,283 1	[1,434 1		,593	1,676 1
Feet	150	12	21	33	47	49	84	103	123	144	167	192	218	245	275	306	338	373	604	944	485	526	895	614	499	716	770	826	884		1,005 1		,135 1	,203 1	_	,344 1	_		
Total heightFeet	140	Ξ	20	31	44	9	78	95	113	133	154	177	201	227	254	283	313	345	379	413		488	528		_	899	718		825	881		998 1,	,059 1,	,122 1,	,188 1,	1,254 1,	_	1,394 1,	
Tota	130	10	18	28	41	99	72	87		122				509		260		318			414	450	490	532	575 (620 (1,092			927		,042 1,	-	-			1,1
									_											ĺ														-					
	120						65	79	94	E	129	148	169	190	213	238	797	291	319	348	380	415	452	491	531	573	616	661	707	755	804	855	908	962					
	110	9	15	24	35	47	28	71	85	100	116	134	152	172	193	215	239	263	289	317	348	381	415	450	487	525	199	605	648										
	100	80	14	22	31	42	52	63	9/	89	104	120	136	154	173	193	214	237	262	289	317	346	377	409	442	477	513	550	589										
	90	7	13	20	28	36	94	95	67	79	95	106	121	137	154	172	191	213	236	260	285	312	339	368	398	429	462	495	530										
	80	9	=	17	24	31	39	48	58	69	80	95	105	119	134	151	170	189	209	231	253	277	302	327															
	70	5	10	15	21	27	33	41	64	59	89	79	96	103	117	132	148	165	183	202	222	242	797	286															
	09	72	80	12	17	22	28	34	41	49	57	99	77	88	101	113	127																						
	20	4	7	01	13	18	22	27	33	040	47	55	49	74	84																								
	04	٣	2	7	9	13	17	2.1	56	32	38	44																											
Diameter breast height	inches_	9	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	04	42	44	94	48	50	52	54	95	58	09	62	49	99	89	70	72	74	76	78	80

1/ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9.
NOTE.--Block indicates extent of data.

Diameter breast height											Total hei	Total heightFeet									
outside bark	04	20	09	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
0	22	35	51	72	93	114	136	158	181	204	228	252	277								
12	33	52	74	101	129	157	185	215	245	275	307	339	373								
141	94	72	101	135	170	206	242	280	318	357	397	439	482								
16	62	96	132	175	218	262	307	353	0017	644	499	551	609								
18	81	123	168	219	271	324	379	435	492	551	612	675	240								
20	102	154	208	269	330	393	458	525	593	_† 99	736	812	890	971	1,055	1,142					
22	127	188	252	323	395	694	545	623	703	786	872	196	1,053	1,148	1,247	1,350					
24	154	226	301	382	994	551	639	730	823	919	1,019	1,122	1,229	1,340	1,455	1,575					
26	184	267	353	447	543	049	741	845	952	1,062	1,177	1,295	1,418	1,546	1,679	1,818					
28		312	410	516	625	736	850	896	1,090	1,216	1,346	1,481	1,621	1,767	1,919	2,077					
30		360	472	591	713	838	296	1,100	1,237	1,379	1,526	1,679	1,838	2,003	2,175	2,354	2,541	2,735	2,938	3,150	3,371
32		411	537	670	807	246	1,091	1,240	1,394	1,553	1,718	1,890	2,068	2,253	2,447	2,648	2,858	3,077	3,306	3,544	3,793
34			607	755	907	1,063	1,223	1,389	1,560	1,737	1,921	2,112	2,311	2,518	2,734	2,959	3,194	3,439	3,694	3,961	4,240
36			681	844	1,012	1,185	1,362	1,545	1,735	1,931	2,135	2,347	2,568	2,798	3,037	3,287	3,548	3,820	4,104	4,401	4,711
38				939	1,124	1,313	1,509	1,710	1,919	2,136	2,361	2,595	2,838	3,092	3,356	3,632	3,920	4,221	4,536	4,864	5,207
940				1,039	1,241	1,449	1,663	1,884	2,113	2,351	2,597	2,854	3,121	3,400	3,691	3,994	4,311	4,642	4,989	5,350	5,728
42				1,143	1,364	1,590	1,824	2,066	2,316	2,576	2,845	3,126	3,418	3,723	4,041	4,374	4,721	5,084	5,463	5,855	6,273
44				1,253	1,492	1,739	1,993	2,256	2,528	2,811	3,105	3,410	3,729	4,061	4,408	4,770	5,149	5,545	5,958	6,391	6,843
94				1,367	1,627	1,894	2,170	2,455	2,750	3,056	3,375	3,707	4,053	4,413	4,790	5,184	5,595	6,026	9/4'9	946'9	7,438
84				1,487	1,767	2,056	2,354	2,661	2,981	3,312	3,657	4,016	4,390	4,780	5,188	5,615	090'9	6,526	7,014	7,524	8,058
20				1,612	1,914	2,224	2,545	2,877	3,221	3,578	3,950	4,337	4,740	5,162	5,602	6,062	6,544	7,047	7,574	8,125	8,702
52						2,399	2,744	3,100	3,470	3,854	4,254	4,670	5,104	5,558	6,032	6,527	7,046	7,588	8,155	8,749	9,370
54						2,581	2,950	3,332	3,729	4,140	4,569	5,016	5,482	5,969	6,477	7,009	7,566	8,148	8,758	9,396	10,064
95						2,769	3,164	3,572	3,996	4,437	968, 4	5,374	5,873	6,394	6,939	7,509	8,105	8,729	9,382	10,066	10,782
58						2,964	3,385	3,821	4,274	4,744	5,234	5,744	6,277	6,834	7,416	8,025	8,662	9,329	10,028	10,759	11,524
09						3,165	3,614	4,078	4,560	5,061	5,583	6,127	6,695	7,288	7,909	8,558	9,238	9,950	10,695	11,475	12,292
62									4,856	5,388	5,943	6,522	7,126	7,757	8,418	9,109	9,832	10,590	11,383	12,214	13,084
49									5,161	5,726	6,315	6,929	7,571	8,241	8,942	9,676	10,445	11,250	12,093	12,976	13,900
99									5,475	4/0,9	869,9	7,349	8,028	8,739	9,483	10,261	11,076	11,930	12,824	13,761	14,742
89									5,798	6,432	7,092	7,780	8,500	9,252	10,039	10,863	11,726	12,630	13,577	14,569	15,608
70									6,131	6,800	7,497	8,225	8,985	9,779	10,611	11,482	12,394	13,350	14,351	15,399	16,498
72											7,914	8,681	9,483	10,321	11,199	12,118	13,081	14,089	15,146	16,253	17,414
74											8,341	9,150	9,995	10,878	11,803	12,771	13,786	14,849	15,963	17,130	18,354
76											8,781	9,631	10,520	11,449	12,422	13,442	14,509	15,628	16,801	18,030	19,318
78											9,231	10,124	11,058	12,035	13,058	14,129	15,251	16,428	17,661	18,953	20,308
80											9,695	10,630	11,610	12,635	13,709	14,834	16,012	17,247	18,542	19,899	21,321

 $\frac{1}{2}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Diameter breast height											Total he	Total heightFeet	t								
outside bark inches1/	40	20	09	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
12	$\frac{2}{2}$ 23	36	56	77	97	117	137	158	178	198	219	239	. 259								
14	23	64	77	104	132	159	187	215	242	270	298	325	353								
16	28	49	100	136	172	208	244	280	317	353	389	425	194								
82	35	81	127	172	218	764	309	355	401	944	492	538	583								
20	43	100	156	213	569	325	382	438	495	551	209	499	720	777	833	889					
22	53	121	189	257	326	394	462	530	599	199	735	803	872	046	1,008	1,076					
24	63	144	225	306	387	694	550	631	712	794	875	956	1,037	1,118	1,200	1,281					
52	73	169	797	359	455	550	645	741	836	931	1,027	1,122	1,217	1,313	1,408	1,503					
28		196	306	417	527	638	748	859	970	1,080	1,191	1,301	1,412	1,522	1,633	1,743					
30		225	352	478	909	732	859	986	1,113	1,240	1,367	1,494	1,621	1,748	1,874	2,001	2,128	2,255	2,382	2,509	2,636
32		256	400	544	689	833	978	1,122	1,266	1,411	1,555	1,700	1,844	1,988	2,133	2,277	2,421	2,566	2,710	2,855	2,999
34			452	615	778	941	1,104	1,267	1,430	1,593	1,756	1,919	2,082	2,245	2,408	2,571	2,734	2,897	3,060	3,223	3,386
36			904	689	872	1,054	1,237	1,420	1,603	1,785	1,968	2,151	2,334	2,516	2,699	2,882	3,065	3,247	3,430	3,613	3,796
38				768	176	1,175	1,379	1,582	1,786	1,989	2,193	2,397	2,600	2,804	3,007	3,211	3,415	3,618	3,822	4,025,	4,229
04				851	1,076	1,302	1,527	1,753	1,979	2,204	2,430	2,655	2,881	3,107	3,332	3,558	3,784	4,009	4,235	4,460	4,686
42				938	1,187	1,435	1,684	1,933	2,181	2,430	2,679	2,928	3,176	3,425	3,674	3,923	4,171	4,420	4,669	4,918	5,166
44				1,029	1,302	1,575	1,848	2,121	2,394	2,667	2,940	3,213	3,486	3,759	4,032	4,305	4,578	4,851	5,124	5,397	5,670
94				1,125	1,423	1,722	2,020	2,318	2,617	2,915	3,213	3,512	3,810	4,109	4,407	4,705	5,004	5,302	5,600	5,899	6,197
84				1,225	1,550	1,875	2,199	2,524	2,849	3,174	3,499	3,824	4,149	4/4,4	4,799	5,123	5,448	5,773	6,098	6,423	6,748
20				1,329	1,682	2,034	2,387	2,739	3,092	3,444	3,797	4,149	4,502	4,854	5,207	5,559	5,912	6,264	6,617	6,969	7,322
52						2,200	2,581	2,963	3,344	3,725	4,106	4,488	4,869	5,250	5,632	6,013	6,394	6,775	7,157	7,538	7,919
54						2,373	2,784	3,195	3,606	4,017	4,428	048,4	5,251	5,662	6,073	6,484	6,895	7,307	7,718	8,129	8,540
56						2,552	2,994	3,436	3,878	4,320	4,763	5,205	2,647	680*9	6,531	4/6,9	7,416	7,858	8,300	8,742	9,184
58						2,737	3,211	3,686	4,160	4,634	5,109	5,583	6,057	6,532	7,006	7,481	7,955	8,429	8,904	9,378	9,852
09						2,929	3,437	3,944	4,452	4,960	2,467	5,975	6,482	066,9	7,498	8,005	8,513	9,021	9,528	10,036	10,543
62									4,754	5,296	5,838	6,380	6,922	7,464	8,006	8,548	9,090	9,632	10,174	10,716	11,258
49									5,065	5,643	6,220	6,798	7,376	7,953	8,531	9,108	989,6	10,263	10,841	11,419	11,996
99									5,387	6,001	6,615	7,230	7,844	8,458	9,072	989,6	10,301	10,915	11,529	12,143	12,758
89									5,718	6,370	7,022	7,674	8,326	8,978	9,630	10,282	10,934	11,586	12,238	12,890	13,542
70									090'9	6,751	7,441	8,132	8,823	9,514	10,205	10,896	11,587	12,278	12,969	13,660	14,351
72											7,873	8,604	9,335	10,066	10,797	11,528	12,259	12,990	13,721	14,452	15,183
74											8,316	9,088	9,861	10,633	11,405	12,177	12,949	13,721	14,493	15,266	16,038
76											8,772	9,586	10,401	11,215	12,030	12,844	13,659	14,473	15,287	16,102	16,916
78											9,240	10,097	10,955	11,813	12,671	13,529	14,387	15,245	16,103	16,960	17,818
80											9,719	10,622	11,524	12,427	13,329	14,232	15,134	16,037	16,939	17,841	18,744

 $[\]frac{1}{2}$ Diameter classes are midpoint; e.g. 12-inch class includes 11.0-12.9.

NOTE.--Block indicates extent of data. $\frac{2}{2}$ The volume of a tree with a minimum saw log 8 inches d.i.b. and 12 feet long is 23 board feet. Trees lacking this minimum saw log have no Ścribner volume.

1	Diameter breast height										-	Total heightFeet	htFeet									
1	outside bark	04	50	09	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
1																						
1	9	2	~	4	4	2	2	9	9	7	80	00	9	6								
1	00	4	2	9	7	80	6	10	12	13	14	15	16	17								
1		7	6	01	12	14	15	17	19	20	22	77	26	27								
1. 1. 1. 1. 1. 1. 1. 1.	12	10	13	15	18	21	23	26	28	31	33	36	39	41								
1	14	14	18	22	25	29	32	36	017	43	47	51	54	58								
1	. 91	19	24	29	34	39	43	84	53	58	63	89	72	77								
14 15 15 15 15 15 14 14	18	25	31	37	44	20	56	62	89	75	81	87	93	100								
1,	20	31	33	47	55	62	70	78	98	93	101	109	117	125	132	140	148					
46 63 69 92 113 126 135 146 160 103 244 257 68 236 218 236 231 244 257 486 218 236 244 257 244 257 244 257 244 257 244 257 244 257 244 257 244 257 244 257 244 257 244 245 449	22	38	48	57	67	76	98	95	105	114	124	133	143	153	162	172	181					
54 68 81 95 108 122 135 149 165 176 139 237 249 254 257 249 257 249 258 349 136 349 359 340 489 480	24	947	57	69	80	92	103	115	126	137	149	160	172	183	195	506	218					
11 127 142 146 156 174 150 206 221 237 256 256 347 345 347 356 347 346 450 440	26	54	89	81	95	108	122	135	149	163	176	190	203	217	230	244	257					
110 128 146 149 229 229 229 229 239	28		79	95	==	127	142	158	174	190	506	221	237	253	569	285	301					
142 166 677 188 209 230 231 237 232 333 334 456 473 476 473 475 476 475 476 475 476 475 476 475 476	30		91	110	128	146	164	183	201	219	237	256	274	292	310	329	347	365	384	402	420	438
147 166 189 213 2237 260 284 396 332 345 345 445 447 477	32		104	125	146	167	188	209	230	251	272	292	313	334	355	376	397	418	439	459	480	501
160 187 213 240 267 293 326 346 373 400 426 453 486 596 553 560 566 686 686 583 588 588 328	34			142	166	189	213	237	260	284	308	332	355	379	403	426	450	474	497	521	545	568
209 238 268 298 387 417 447 477 507 556 556 656 656 656 656 656 656 656 656 656 656 666 667 667 676 676 676 686 686 689 689 842 757 757 756 866 656 669 686 689 689 842 878 889 <td>36</td> <td></td> <td></td> <td>160</td> <td>187</td> <td>213</td> <td>240</td> <td>267</td> <td>293</td> <td>320</td> <td>346</td> <td>373</td> <td>004</td> <td>426</td> <td>453</td> <td>480</td> <td>909</td> <td>533</td> <td>260</td> <td>586</td> <td>613</td> <td>640</td>	36			160	187	213	240	267	293	320	346	373	004	426	453	480	909	533	260	586	613	640
232 265 298 331 364 491 497 530 563 652 662 662 663 723 769 806 723 769 806 723 769 806 723 766 806 723 766 806 723 766 806 723 766 806 723 766 806 723 766 806 723 766 806 723 766 806 723 766 806 723 766 806 723 766 806 723 771 819 867 913 910 1,105 1,106<	38				209	238	268	298	328	358	387	417	4447	477	507	536	995	965	979	959	685	715
256 293 356 403 476 513 546 624 686 623 659 696 672 756 686 772 776 806 806 806 802 971 11.015 971 11.015 971 11.015 971 11.015 971 11.015 971 11.015 971 11.015 972 973 971 11.015 972 971 11.015 972 971 11.015 972 971 11.015 972 973 973 973 973 973 973 973 973 973 973 973 973 974 975	940				232	265	298	331	364	397	431	494	497	530	563	965	629	662	969	729	762	795
282 352 403 443 484 524 664 645 685 725 756 806 846 881 883 725 756 806 843 883 971 1,015 1,015 1,015 1,015 1,015 1,015 1,015 1,016 1,106 1,108 357 419 442 520 578 684 662 706 705 795 893 983 994 995 1,012 1,012 1,016 1,108	42				256	293	330	366	403	439	476	513	549	586	623	659	969	732	769	806	842	879
337 385 434 482 530 578 658 674 723 771 819 867 915 963 1,007 1,108 1,108 1,101 1,018 1,101 1,018 1,101 1,018 1,101 1,018 1,101 1,10	44				282	322	363	403	443	484	524	564	409	949	685	725	99/	908	846	887	927	296
337 385 434 462 530 578 626 661 733 786 888 890 943 995 1,047 1,100 1,108 1,108 1,109 1,10	94				309	353	397	441	984	530	574	618	662	902	750	795	839	883	927	971	1,015	1,059
367 419 471 524 576 628 681 738 786 838 890 943 995 1,047 1,100 1,152 1,204 1,100 1,152 1,204 1,100 1,152 1,204 1,100 1,152 1,204 1,107 1,102 1,124 1,107 1,102 1,104 1,107 1,104 1,104 1,107 1,107 1,104 1,104 1,107 1,104 1,104 1,107 1,104 1,104 1,107 1,104 1,104 1,107 1,104 1,107 1,104 1,104 1,107 1,104 1,104 1,107 1,104 1,104 1,107 1,104 1,104 1,107 1,104 1,104 1,104 1,104 1,107 1,104 1,104 1,107 1,104 1,104 1,104 1,104 1,104 1,107 1,104 1,104 1,104 1,104 1,104 1,104 1,104 1,104 1,104 1,104 1,104 1,104 1,	84				337	385	434	482	530	578	626	674	723	771	819	867	915	963	1,012	1,060	1,108	1,156
511 567 624 681 738 794 851 908 965 1,021 1,078 1,135 1,192 1,192 1,194 1,410 1,916 1,287 1,192 1,194 1,194 1,195 1,195 1,195 1,195 1,196 1,305 1,195 1,195 1,195 1,196 1,196 1,197 1,194 1,196 1,197 1,194 1,196 1,197 1,194 1,196 1,197 1,194 1,196 1,197 1,194 1,196 1,197 1,196 1,197 1,196 1,197 1,196 1,197 1,196 1,197 1,196 1,197	20				367	614	471	524	576	628	681	733	786 .	838	890	943	995	1,047	1,100	1,152	1,204	1,257
552 613 674 736 797 858 919 981 1,042 1,116 1,226 1,226 1,226 1,236 1,410	52						511	267	624	681	738	794	851	806	965	1,021	1,078	1,135	1,192	1,248	1,305	1,362
594 660 726 792 924 990 1,056 1,125 1,126 1,366 1,452 1,516 1,126 1,127 1,348 1,446 1,520 1,518	54						552	613	4/9	736	797	858	919	981	1,042	1,103	1,165	1,226	1,287	1,348	1,410	1,471
684 760 836 912 988 1,064 1,136 1,216 1,292 1,368 1,444 1,520 1,596 1,672 1,748 1,489 1,418 1,489 1,488 1,488 1,488 1,488 1,489 1,560 1,681 1,489 1,602 1,748 1,200 1,387 1,477 1,569 1,667 1,661 1,765 1,863 1,916 2,030 2,184 2,285 1,248 1,520 1,384 1,477 1,569 1,667 1,687 1,916 2,080 2,184 2,288 2,392 1,248 1,327 1,447 1,569 1,667 1,788 1,916 2,080 2,184 2,288 2,392 1,248 1,324 1,625 1,647 1,762 1,863 1,967 2,080 2,184 2,288 2,392 1,248 1,324 1,625 1,647 1,788 1,982 2,093 2,203 2,313 2,423 2,533 1,447 1,863 1,967 2,096 2,213 2,332 2,446 2,562 2,678 1,721 1,844 1,967 2,090 2,213 2,332 2,446 2,562 2,678 1,721 1,844 1,967 2,090 2,213 2,332 2,462 2,592 2,703 2,313 2,423 2,887 1,721 1,814 1,944 2,073 2,203 2,313 2,462 2,592 2,728 2,887 3,001 3,138 1,138	26						594	099	726	792	858	924	990	1,056	1,122	1,188	1,254	1,320	1,386	1,452	1,518	1,585
684 760 836 912 988 1,064 1,140 1,216 1,292 1,368 1,444 1,520 1,596 1,675 1,748 1,802 1,004 1,127 1,214 1,300 1,387 1,474 1,569 1,667 1,675 1,864 1,938 2,030 2,123 1,107 1,248 1,352 1,456 1,567 1,664 1,768 1,893 2,093 2,103 2,133 2,423 2,533 1,248 1,352 1,447 1,863 1,967 2,096 2,213 2,332 2,446 2,562 2,678 1,721 1,844 1,967 2,090 2,213 2,332 2,446 2,562 2,678 1,721 1,844 1,967 2,093 2,213 2,332 2,446 2,562 2,678 1,721 1,844 1,947 2,033 2,333 2,462 2,592 2,721 2,881 2,981 1,721 1,814 1,944 2,073 2,203 2,313 2,452 2,728 2,887 3,001 3,138	58						638	709	780	851	922	993	1,064	1,135	1,206	1,277	1,348	1,418	1,489	1,560	1,631	1,702
975 1,056 1,138 1,219 1,300 1,381 1,44 1,560 1,647 1,734 1,625 1,706 1,788 1,894 1,004 1,1127 1,214 1,300 1,387 1,477 1,569 1,661 1,765 1,863 1,917 2,059 2,157 2,255 1,248 1,352 1,456 1,560 1,664 1,768 1,893 2,030 2,184 2,288 2,392 1,248 1,352 1,456 1,560 1,664 1,768 1,893 2,093 2,203 2,184 2,288 2,392 1,542 1,530 1,747 1,863 1,980 2,096 2,213 2,329 2,446 2,562 2,678 1,721 1,844 1,967 2,090 2,213 2,335 2,493 2,703 2,313 2,423 2,887 1,721 1,844 1,967 2,090 2,213 2,335 2,493 2,703 2,703 2,887 1,981 1,910 2,046 2,183 2,333 2,462 2,592 2,721 2,851 2,981 1,910 2,046 2,183 2,319 2,456 2,562 3,001 3,138	09						684	760	836	912	988	1,064	1,140	1,216	1,292	1,368	1,444	1,520	1,596	1,672	1,748	1,824
1,040 1,127 1,214 1,300 1,387 1,474 1,560 1,647 1,734 1,820 1,997 1,994 1,007 1,200 1,292 1,384 1,477 1,569 1,667 1,765 1,866 1,918 2,030 2,157 2,255 1,248 1,352 1,456 1,560 1,664 1,768 1,872 1,997 2,093 2,197 2,089 2,197 2,288 2,392 1,542 1,542 1,552 1,644 1,768 1,897 2,093 2,203 2,313 2,423 2,533 1,541 1,542 1,542 1,552 1,863 1,980 2,096 2,213 2,329 2,446 2,562 2,678 1,721 1,844 1,967 2,090 2,213 2,336 2,499 2,582 2,705 2,827 1,814 1,944 2,073 2,203 2,313 2,452 2,705 2,705 2,891 1,910 2,046 2,183 2,319 2,456 2,592 2,728 2,865 3,001 3,138	62									975	1,056	1,138	1,219	1,300	1,381	1,463	1,544	1,625	1,706	1,788	1,869	1,950
1,107 1,200 1,292 1,384 1,477 1,569 1,661 1,765 1,846 1,938 2,030 2,125 1,248 1,352 1,456 1,560 1,664 1,768 1,897 2,093 2,203 2,313 2,423 2,533 1,542 1,552 1,762 1,863 1,980 2,096 2,213 2,329 2,446 2,562 2,678 1,721 1,844 1,967 2,090 2,213 2,336 2,459 2,582 2,705 2,827 1,814 1,944 2,073 2,203 2,313 2,462 2,592 2,721 2,851 2,981 1,910 2,046 2,183 2,319 2,456 2,592 2,728 2,865 3,001 3,138	49									1,040	1,127	1,214	1,300	1,387	1,474	1,560	1,647	1,734	1,820	1,907	1,994	2,080
1,248 1,352 1,456 1,664 1,768 1,872 1,976 2,080 2,184 2,288 2,392 1,248 1,352 1,456 1,560 1,664 1,768 1,872 1,976 2,080 2,184 2,288 2,392 1,542 1,542 1,652 1,762 1,873 1,981 2,093 2,203 2,313 2,423 2,533 1,630 1,747 1,863 1,980 2,096 2,213 2,329 2,446 2,562 2,678 1,721 1,844 1,967 2,090 2,213 2,336 2,459 2,582 2,705 2,827 1,814 1,944 2,073 2,203 2,333 2,462 2,592 2,721 2,851 2,981 1,910 2,046 2,183 2,319 2,456 2,592 2,728 2,865 3,001 3,138	99									1,107	1,200	1,292	1,384	1,477	1,569	1,661	1,753	1,846	1,938	2,030	2,123	2,215
1,248 1,352 1,456 1,560 1,664 1,768 1,976 2,080 2,184 2,288 2,392 1,593 1,593 2,003 2,184 2,288 2,392 1,593 1,542 1,552 1,762 1,873 1,983 2,093 2,203 2,313 2,423 2,533 1,630 1,747 1,863 1,980 2,096 2,213 2,329 2,446 2,562 2,678 1,721 1,844 1,967 2,090 2,213 2,336 2,459 2,582 2,705 2,827 1,814 1,944 2,073 2,203 2,333 2,462 2,592 2,721 2,851 2,981 1,910 2,046 2,183 2,319 2,456 2,592 2,728 2,865 3,001 3,138	89									1,177	1,275	1,373	1,471	1,569	1,667	1,765	1,863	1,961	2,059	2,157	2,255	2,354
1,542 1,652 1,762 1,863 1,983 2,093 2,203 2,313 2,423 2,533 1,638 1,980 2,096 2,213 2,329 2,446 2,562 2,678 1,721 1,844 1,967 2,090 2,213 2,336 2,459 2,582 2,705 2,827 1,814 1,944 2,073 2,203 2,333 2,462 2,592 2,721 2,851 2,981 1,910 2,046 2,183 2,319 2,456 2,592 2,728 2,865 3,001 3,138	70									1,248	1,352	1,456	1,560	1,664	1,768	1,872	1,976	2,080	2,184	2,288	2,392	2,496
1,630 1,747 1,863 1,980 2,096 2,213 2,329 2,446 2,562 2,678 1,721 1,844 1,967 2,090 2,213 2,336 2,459 2,582 2,705 2,827 1,814 1,944 2,073 2,203 2,333 2,462 2,592 2,721 2,851 2,981 1,910 2,046 2,183 2,319 2,456 2,592 2,728 2,865 3,001 3,138	72											1,542	1,652	1,762	1,873	1,983	2,093	2,203	2,313	2,423	2,533	2,644
	74											1,630	1,747	1,863	1,980	2,096	2,213	2,329	2,446	2,562	2,678	2,795
1,814 1,944 2,073 2,203 2,333 2,462 2,592 2,721 2,851 2,981 1,910 2,046 2,183 2,319 2,456 2,592 2,728 2,865 3,001 3,138	76											1,721	1,844	1,967	2,090	2,213	2,336	2,459	2,582	2,705	2,827	2,950
1,910 2,046 2,183 2,319 2,456 2,592 2,728 2,865 3,001 3,138	78											1,814	1,944	2,073	2,203	2,333	2,462	2,592	2,721	2,851	2,981	3,110
	80											1,910	2,046	2,183	2,319	2,456	2,592	2,728	2,865	3,001	3,138	3,274

 $\frac{1}{2}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

10 11 12 13 14 15 15 15 15 15 15 15										_	Total heightFeet	jhtFeet									
13 143 149 156 151 134 148 161 175 189	\mathbb{H}	9		70	80	96	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
13 143 149 156 124 134 149 151 134 135 189 139																					
174 127 127 128		, ,	21	37	43	64	29	62	69	9/	84	92	66								
174 222 2157 176 186 217 223 226 236		•	25	73	85	97	109	121	134	148	191	175	189								
174 202 229 228 236 216 246 218 256 259		=	10	119	137	157	176	196	217	237	259	280	303								
240 277 315 315 319 452 452 461 572 472 710 1980 1.030 1.132 1.204	122 1	-	48	174	202	229	258	586	316	346	376	407	439								
11 11 11 11 11 11 11 1	168		203	240	277	315	353	392	432	473	514	556	599								
1939 460 523 586 615 716 716 716 717 7189 1.000 1.132 1.000 1.132 1.000 1.132 1.000 1.132 1.000 1.132 1.000 1.132 1.000 1.132 1.000	220		267	315	363	412	463	514	995	618	672	727	782	839	968	954					
493 569 646 724 803 884 966 1,104 1,136 1,136 1,137 1,139 1,139 1,139 1,139 1,139 1,139 1,139 1,135 1,135 1,135 1,136 1,135 1,136 1,135 1,136 1,135 1,136 1,135 1,	280	_	339	399	094	523	586	651	716	783	850	919	989	1,060	1,132	1,204					
1, 14 1, 14 1, 15 1, 14 1, 15 1, 1, 14 1, 1, 15 1, 1, 14 1, 1, 15 1, 1, 14 1, 1, 15 1, 1, 14 1, 1, 15 1, 1, 14 1, 1, 1, 15 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	346		419	493	569	949	724	803	884	996	1,049	1,133	1,219	1,306	1,394	1,483					
1,115 1,11	419		202	597	889	781	875	971	1,068	1,167	1,267	1,369	1,472	1,577	1,683	1,790					
1,090 1,122 1,135 1,469 1,626 1,765 1,906 2,046 2,193 2,190 2,489 2,640 2,792 2,947 3,104 1,621 1,135 1,465 1,765 1,765 2,246 2,246 2,246 2,246 2,246 2,246 2,246 3,246 3,264 3,136 3,10	499		409	711	819	929	1,041	1,155	1,270	1,387	1,506	1,626	1,748	1,872	1,998	2,125					
967 1.114 1.263 1.415 1.569 1.725 1.883 2.904 2.207 2.372 2.729 2.709 2.800 3.054 3.721 3.400 1.309 1.	586		709	834	196	1,090	1,221	1,354	1,489	1,626	1,765	1,906	2,048	2,193	2,340	2,489	2,640	2,792	2,947	3,104	3,262
1,109 1,1278 1,449 1,623 1,799 1,978 2,143 2,522 2,748 3,088 3,305 3,705 3,409 3,701 3,905 1,905 1,205 1,449 1,203 1,449 1,102 1,449 1,429 1,449 1,429 1,449 1,429 1,434 1,439 1,434 1,439 1,449 1,429 1,449 1,449 1,429 1,449	679		822			1,263	1,415	1,569	1,725	1,883	2,044	2,207	2,372	2,539	2,709	2,880	3,054	3,231	3,409	3,590	3,773
1,521 1,453 1,684 1,845 2,045 2,248 2,454 2,662 2,874 3,308 3,309 3,525 3,746 4,479 4,224 4,479 4,294 4,499 1,524 1,838 2,048 2,381 2,383 2,383 3,093 3,741 4,089 4,411 4,469 4,711 4,446 4,729 5,478 2,188 2,181 2,583 2,887 3,180 3,741 4,090 3,148 1,114 4,469 4,111 4,469 4,111 4,449 2,181 2,181 2,183 2,181 2,181 2,183 2,181 4,111 4,469 4,469 4,111 4,469 4,111 4,469 4,111 4,469 4,111 4,469 4,111 4,469						1,449	1,623	1,799	1,978	2,159	2,343	2,529	2,718	2,910	3,104	3,300	3,499	3,701	3,905	4,112	4,321
1,639 1,636 2,306 2,536 3,767 3,240 3,481 3,726 4,624 4,472 4,448 4,729 4,736 4,936 1,836 2,082 2,331 2,583 3,999 3,741 4,681 4,920 5,222 5,971 5,937 6,526 2,045 2,386 2,866 3,489 3,741 4,448 4,729 5,013 5,301 5,292 2,045 2,386 2,866 4,020 5,480		-				1,647	1,845	2,045	2,248	2,454	2,662	2,874	3,088	3,305	3,525	3,748	3,974	4,203	4,434	4,668	4,905
1,836 2,082 2,331 2,583 2,839 3,361 3,628 3,989 4,171 4,448 4,729 5,013 5,301 5,592 2,505 2,046 2,567 2,875 3,184 3,499 3,741 4,038 4,842 4,950 5,262 5,577 5,897 6,220 2,249 2,249 2,249 2,318 2,255 2,887 4,466 4,866 4,821 2,495 5,263 6,412 6,737 7,249 5,747 2,897 6,222 2,495 2,495 3,164 4,572 3,847 4,516 5,037 5,449 6,331 6,412 6,732 6,412 6,739 7,184 8,349 3,847 4,516 5,037 5,449 6,331 6,412 6,737 7,241 6,737 7,241 7,674 8,133 8,597 9,067 2,907 4,522 5,242 6,444 6,552 7,544 8,713 7,241 7,674 8,133 8,597 9,067 4,522 4,522 5,480 6,242 6,444 6,552 7,544 8,713 7,241 7,674 8,133 4,435 4,435 6,412 6,444 6,552 7,544 8,713 7,467 7,988 8,546 9,203 9,780 10,137 10,690 4,435 4,435 6,412 6,444 6,552 7,544 8,747 7,487 8,649 9,447 9,248 1,457 1,443 1,435 1,						1,858	2,081	2,306	2,535	3,767	3,002	3,240	3,481	3,726	3,974	4,224	4,479	4,736	966,4	5,260	5,526
2,264 2,595 2,896 3,166 3,449 3,741 4,038 4,642 4,950 5,262 5,577 5,897 6,225 6,822 2,264 2,267 2,887 3,168 3,499 3,741 4,081 5,137 5,478 5,577 5,897 6,225 6,882 2,264 2,267 3,165 3,168 4,141 4,469 4,801 5,137 5,478 6,171 6,735 6,171 6,735 6,171 6,735 7,149 7,574 8,822 6,171 6,735 6,171 6,736 6,173 7,029 7,449 7,574 8,136 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td>2,082</td> <td>2,331</td> <td>2,583</td> <td>2,839</td> <td>3,099</td> <td>3,361</td> <td>3,628</td> <td>3,898</td> <td>4,171</td> <td>4,448</td> <td>4,729</td> <td>5,013</td> <td>5,301</td> <td>5,592</td> <td>5,886</td> <td>6,184</td>						2,082	2,331	2,583	2,839	3,099	3,361	3,628	3,898	4,171	4,448	4,729	5,013	5,301	5,592	5,886	6,184
2,264 2,267 2,883 3,184 3,499 3,818 4,141 4,469 4,801 5,137 5,478 6,822 6,171 6,525 6,173 6,173 6,173 6,173 6,173 7,184 7,577 2,495 2,828 3,165 3,165 3,847 4,202 5,237 5,238 6,632 6,613 6,793 7,184 7,577 8,386 2,886 6,032 6,613 7,029 7,449 7,577 8,386 8,384 8,487 9,489 7,571 8,986 9,029 9,498 8,186 8,186 8,187 9,489 9,699 9,029 9,886 8,594 9,789 9,789 9,789 9,029 9,896 10,954 11,452 11,463 11,425 11,463 11,425 11,463 11,425 11,483 11,452 11,483 11,452 11,483 11,452 11,483 11,452 11,483 11,452 11,483 11,452 11,483 11,452 11,483 11,452 11			,-			2,318	2,595		3,160	3,449	3,741	4,038	4,338	4,642	4,950	5,262	5,577	5,897	6,220	6,548	6,879
2,495 2,828 3,165 3,507 3,854 4,206 4,522 5,288 5,658 6,032 6,412 6,795 7,184 7,574 2,737 3,102 3,447 4,512 5,002 5,397 5,798 6,503 6,613 7,449 7,895 8,318 8,349 9,005 2,990 3,388 3,722 4,616 5,037 5,463 5,798 6,503 6,613 7,029 7,449 7,875 8,306 3,687 4,126 4,572 5,023 5,480 5,943 6,412 6,737 7,274 8,138 8,847 9,596 9,590 10,137 10,690 3,587 4,126 6,594 6,412 6,887 7,467 7,888 8,516 9,596 9,590 10,137 10,690 9,980 10,137 10,698 11,527 11,462 11,487 11,487 11,489 11,489 11,489 11,489 11,489 11,489 11,489 11,489 11,489			,-			2,567	2,873		3,499	3,818	4,141	4,469	4,801	5,137	5,478	5,822	6,171	6,525	6,882	7,244	7,610
2,337 3,402 3,442 5,002 5,397 5,798 6,203 6,613 7,029 7,449 7,873 8,102 7,874 8,133 8,506 8,306 2,930 3,388 3,792 4,207 4,616 5,037 5,463 5,943 6,412 6,887 7,368 8,516 8,348 8,847 9,352 9,067 9,067 9,067 9,203 9,862 9,067 9,068 9,067 9,067 <td< td=""><td></td><td></td><td>.4</td><td></td><td></td><td>2,828</td><td></td><td></td><td>3,854</td><td>4,206</td><td>4,562</td><td>4,922</td><td>5,288</td><td>5,658</td><td>6,032</td><td>6,412</td><td>6,795</td><td>7,184</td><td>7,577</td><td>7,975</td><td>8,378</td></td<>			.4			2,828			3,854	4,206	4,562	4,922	5,288	5,658	6,032	6,412	6,795	7,184	7,577	7,975	8,378
2,990 3,388 3,792 4,616 5,037 5,480 6,331 6,773 7,221 7,674 8,133 8,597 9,067 3,687 4,126 4,572 5,023 5,480 5,943 6,412 6,887 7,368 7,855 8,348 8,847 9,352 9,862 3,999 4,475 4,958 5,447 5,942 6,444 6,953 7,467 7,988 8,516 9,059 10,137 10,690 4,323 4,837 5,359 5,888 6,422 7,514 8,071 8,634 9,203 9,780 10,364 10,690 10,710 11,462 10,690 10,710 11,462 10,690 10,710 11,462 10,890 <t< td=""><td></td><td></td><td>, ,</td><td></td><td></td><td>3,102</td><td>3,472</td><td></td><td>4,227</td><td>4,612</td><td>5,002</td><td>5,397</td><td>5,798</td><td>6,203</td><td>6,613</td><td>7,029</td><td>7,449</td><td>7,875</td><td>8,306</td><td>8,741</td><td>9,182</td></t<>			, ,			3,102	3,472		4,227	4,612	5,002	5,397	5,798	6,203	6,613	7,029	7,449	7,875	8,306	8,741	9,182
4,126 4,572 5,023 5,480 5,943 6,412 6,887 7,368 7,855 8,346 8,847 9,352 9,862 9,352 9,862 9,352 9,862 9,959 10,137 10,690 9,862 9,862 9,136 9,135 10,690 10,690 10,137 10,690 10,690 10,137 10,690 10,690 10,136 10,137 10,690 10,717 11,462 12,140 12,863 11,522 11,460 12,863 11,530 11,337 12,334 12,334 12,334 12,334 12,334 12,334 12,334 12,334 12,334 12,334 12,334 12,334 12,334 12,334 12,334 12,334 12,33						3,388	3,792		4,616	5,037	5,463	5,894	6,331	6,773	7,221	7,674	8,133	8,597	9,067	9,543	10,023
4,475 4,958 5,447 5,942 6,444 6,953 7,467 7,988 8,516 9,050 9,590 10,137 10,690 4,837 5,359 5,888 6,423 6,965 7,514 8,071 8,634 9,203 9,780 10,364 10,954 11,552 5,214 5,776 6,346 6,922 7,514 8,071 8,634 9,203 9,780 10,364 11,552 11,167 11,863 11,552 11,552 11,524 11,552 11,524 11,425 11,425 11,425 <th< td=""><td></td><td></td><td></td><td></td><td></td><td>3,687</td><td>4,126</td><td></td><td>5,023</td><td>5,480</td><td>5,943</td><td>6,412</td><td>6,887</td><td>7,368</td><td>7,855</td><td>8,348</td><td>8,847</td><td>9,352</td><td>9,862</td><td>10,379</td><td>10,901</td></th<>						3,687	4,126		5,023	5,480	5,943	6,412	6,887	7,368	7,855	8,348	8,847	9,352	9,862	10,379	10,901
4,837 5,359 5,888 6,423 6,965 7,514 8,071 8,634 9,203 9,780 10,364 10,954 11,552 11,675 11,675 11,675 11,524 11,167 11,524 11,167 11,803 11,524 11,465 11,803 11,167 11,803 12,446 11,524 11,167 11,803 11,524 11,167 11,803 12,446 12,863 12,446 11,525 12,000 12,683 12,446 12,863 13,374 12,446 12,863 13,374 12,446 12,863 13,374 12,446 12,863 13,374 12,446 12,863 13,374 12,446 12,874 14,335 12,233 13,039 13,884 14,679 15,513 15,334 14,336 14,336 12,133 13,039 13,884 14,679 15,513 16,336 18,336 14,529 15,418 16,520 17,418 18 18,339 13,344 14,433 12,233 13,038 14,52 16,413 16,413 <t< td=""><td></td><td></td><td></td><td></td><td></td><td>3,999</td><td>4,475</td><td></td><td>2,447</td><td>5,942</td><td>6,444</td><td>6,953</td><td>7,467</td><td>7,988</td><td>8,516</td><td>9,050</td><td>9,590</td><td>10,137</td><td>10,690</td><td>11,250</td><td>11,816</td></t<>						3,999	4,475		2,447	5,942	6,444	6,953	7,467	7,988	8,516	9,050	9,590	10,137	10,690	11,250	11,816
5,214 5,776 6,346 6,922 7,507 8,098 8,697 9,304 9,917 10,538 11,167 [11,803 12,446 5,605 6,209 6,204 6,204 9,347 9,998 10,658 11,325 12,000 12,683 13,374 5,605 6,209 6,204 9,347 10,020 10,718 11,425 12,140 12,863 13,595 14,335 7,812 8,522 9,251 9,980 10,717 11,463 12,18 12,983 13,756 14,538 15,334 8,348 9,106 9,873 10,650 11,437 12,233 13,039 13,854 14,679 15,513 16,337 8,891 9,698 20,515 11,343 12,180 13,028 14,753 15,631 16,520 17,418 9,452 10,309 11,178 12,947 13,847 14,752 15,681 16,514 17,528 18,612 11,860 11,186 12,793 <td< td=""><td></td><td></td><td></td><td></td><td></td><td>4,323</td><td>4,837</td><td></td><td>5,888</td><td>6,423</td><td>96'9</td><td>7,514</td><td>8,071</td><td>8,634</td><td>9,203</td><td>9,780</td><td>10,364</td><td>10,954</td><td>11,552</td><td>12,156</td><td>12,767</td></td<>						4,323	4,837		5,888	6,423	96'9	7,514	8,071	8,634	9,203	9,780	10,364	10,954	11,552	12,156	12,767
5,605 6,209 6,821 7,440 8,068 8,704 9,347 9,998 10,658 11,325 12,000 12,683 13,374 7,313 7,977 8,650 9,331 10,020 10,718 11,425 12,140 12,863 13,595 14,335 8,348 9,106 9,873 10,650 11,437 12,233 13,039 13,854 14,679 15,513 15,336 8,891 9,698 20,515 11,343 12,133 13,039 13,854 14,679 15,513 16,357 8,891 9,698 20,515 11,343 12,133 14,753 15,631 16,520 17,418 9,452 10,309 11,178 12,947 13,847 14,759 15,681 16,614 17,528 18,512 11,860 12,793 13,737 14,692 15,659 16,637 17,626 18,627 19,639 12,563 14,029 15,561 16,586 17,626 18,627 19,639						4,659			946,3	6,922	7,507	8,098	8,697	9,304	9,917	10,538	11,167	11,803	12,446	13,097	13,755
7,977 8,650 9,331 10,020 10,718 11,425 12,140 12,863 13,595 14,336 14,336 14,345 12,18 12,218 12,983 13,596 14,330 14,63 12,218 12,983 13,756 14,536 14,336 15,330 15,336 15,336 15,336 15,336 15,339 14,346 15,218 12,983 13,756 14,537 16,520 17,418 16,327 16,520 17,418 16,327 16,614 17,558 18,512 10,309 11,178 12,057 12,947 13,847 14,759 15,681 16,614 17,558 18,512 11,860 12,793 13,737 14,692 15,689 16,637 17,626 18,627 19,639 12,563 13,550 14,550 15,561 16,585 17,621 18,688 19,728 20,800 13,286 14,330 15,386 16,565 17,538 18,533 19,71 20,843 20,025 23,221						5,009		6,209	6,821	7,440	8,068	8,704	9,347	9,998	10,658	11,325	12,000	12,683	13,374	14,073	14,780
8,532 9,251 9,980 10,717 11,463 12,218 12,983 13,756 14,538 15,330 9,106 9,873 10,650 11,437 12,233 13,039 13,854 14,679 15,513 16,357 9,698 20,515 11,343 12,180 13,028 14,759 15,681 16,614 17,556 18,512 17,418 12,057 12,947 13,847 14,759 15,681 16,614 17,556 18,627 19,639 12,563 13,550 14,550 15,561 16,565 17,621 18,668 19,728 20,800 13,286 14,330 15,386 16,456 17,538 18,633 19,741 20,841 21,994 14,029 15,131 16,246 17,375 18,518 19,673 20,843 22,025 23,221 14,792 15,954 17,130 18,320 19,524 20,742 21,974 23,221 24,481									7,313	7,977	8,650	9,331	10,020	10,718	11,425	12,140	12,863	13,595	14,335	15,084	15,841
9,106 9,873 10,650 11,437 12,233 13,039 13,854 14,679 15,513 16,357 16,357 19,698 20,515 11,343 12,180 13,028 13,885 14,753 15,631 16,520 17,418 10,309 11,178 12,057 12,947 13,847 14,759 15,681 16,614 17,558 18,512 12,563 13,550 14,550 15,563 16,587 17,621 18,668 19,728 20,800 13,286 14,330 15,386 16,456 17,538 18,633 19,741 20,861 21,994 14,029 15,131 16,246 17,375 18,518 19,673 20,843 22,025 23,221 14,792 15,954 17,130 18,320 19,524 20,742 21,974 23,221 24,481									7,822	8,532	9,251	9,980	10,717	11,463	12,218	12,983	13,756	14,538	15,330	16,130	16,939
9,698 20,515 11,343 12,180 13,028 13,885 14,753 15,631 16,526 17,418 10,309 11,178 12,057 12,947 13,847 14,759 15,681 16,614 17,558 18,512 11,860 12,793 13,737 14,692 15,659 16,637 17,626 18,627 19,639 12,563 13,550 14,550 15,561 16,585 17,621 18,668 19,728 20,800 13,286 14,330 15,386 16,456 17,538 18,633 19,741 20,861 21,994 14,029 15,131 16,246 17,375 18,518 19,673 20,843 22,025 23,221 14,792 15,954 17,130 18,320 19,524 20,742 21,974 23,221 24,481									8,348	9,106	9,873	10,650	11,437	12,233	13,039	13,854	14,679	15,513	16,357	17,211	18,074
10,309 11,178 12,057 12,947 13,847 14,759 15,681 16,614 17,558 18,512 11,860 12,793 13,737 14,692 15,659 16,637 17,626 18,627 19,639 12,563 13,550 14,556 15,561 16,585 17,621 18,668 19,728 20,800 13,286 14,330 15,386 16,456 17,538 18,633 19,741 20,861 21,994 14,029 15,131 16,246 17,375 18,518 19,673 20,843 22,025 23,221 14,792 15,954 17,130 18,320 19,524 20,742 21,974 23,221 24,481									8,891	9,698	20,515	11,343	12,180	13,028	13,885	14,753	15,631	16,520	17,418	18,326	19,245
12,793 13,737 14,692 15,659 16,637 17,626 18,628 19,639 13,550 14,550 15,561 16,585 17,621 18,668 19,728 20,800 14,330 15,386 16,456 17,538 18,633 19,741 20,861 21,994 15,131 16,246 17,375 18,518 19,673 20,843 22,025 23,221 15,954 17,130 18,320 19,524 20,742 21,974 23,221 24,481									9,452	10,309	11,178	12,057	12,947	13,847	14,759	15,681	16,614	17,558	18,512	19,477	20,453
13,550 14,550 15,561 16,585 17,621 18,668 19,728 20,800 14,330 15,386 16,456 17,538 18,633 19,741 20,861 21,994 15,131 16,246 17,375 18,518 19,673 20,843 22,025 23,221 15,954 17,130 18,320 19,524 20,742 21,974 23,221 24,481											11,860	12,793	13,737	14,692	15,659	16,637	17,626	18,627	19,639	20,663	21,698
14,330 15,386 16,456 17,538 18,633 19,741 20,861 21,994 15,131 16,246 17,375 18,518 19,673 20,843 22,025 23,221 15,954 17,130 18,320 19,524 20,742 21,974 23,221 24,481											12,563	13,550	14,550	15,561	16,585	17,621	18,668	19,728	20,800	21,884	22,980
15,131 16,246 17,375 18,518 19,673 20,843 22,025 23,221 15,954 17,130 18,320 19,524 20,742 21,974 23,221 24,481											13,286	14,330	15,386	16,456	17,538	18,633	19,741	20,861	21,994	23,139	24,298
15,954 17,130 18,320 19,524 20,742 21,974 23,221 24,481											14,029	15,131	16,246	17,375	18,518	19,673	20,843	22,025	23,221	24,430	25,653
											14,792	15,954	17,130	18,320	19,524	20,742	21,974	23,221	24,481	25,756	27,044

1/ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

	240											2,854	3,315	3,810	4,338	4,901	5,497	6,127	6,790	7,488	8,219	8,984	9,784	10,616	11,483	12,383	13,318	14,286	15,288	16,324	17,393	18,496	19,634	20,805	22,010	23,248	24,521
	230											2,731	3,173	3,647	4,153	4,691	5,262	5,866	6,502	7,170	7,870	8,603	9,369	10,167	10,997	11,860	12,755	13,682	14,642	15,635	16,659	17,716	18,806	19,928	21,082	22,269	23,488
	220											2,608	3,030	3,483	3,967	4,482	5,028	5,605	6,213	6,852	7,522	8,222	8,954	9,717	10,511	11,336	12,192	13,079	13,997	14,946	15,926.	16,936	17,978	19,051	20,155 2	21,290 2	22,456 2
	210											2,486	2,888	3,320	3,782	4,273	4,794	5,344	5,924	6,534	7,173	7,841	8,540	9,268		f		12,475	13,351	14,257	15,192	16,156 1	17,151	18, 175	19,228 2	20,311 2	21,424 2
	200	1										2,363	2,746	3,157	3,596	4,064	4,559	5,083	5,635	6,215	6,824	7,460	8,125	8,818				11,872	12,706	13,568 1	14,458	15,376 1	16,323	17,298 1	18,301 1	19,332 2	20,391 2
	190						824	1,053	1,310	1,593	1,903	2,240	2,603	2,993	3,411	3,854	4,325	4,822	5,346	5,897	6,475	7,079	7,711	8,369	9,053			11,268 1	12,060 1	12,879 1	13,724 1	14,596	15,495	16,421	17,374 1	18,353	19,359 2
	180						777	944	1,237	1,505	1,798	2,117		2,830		3,645	160,4	4,561	5,058	5,579	6,126	869,9	7,296				9,940 1	10,665 1	11,415 1	12,190 1	12,991		14,668 1	15,544 1	16,446	17,374 1	18,327 1
	170						730	935	1,164	1,417	1,693	4661		2,667	3,039		3,856	4,301	692,4	5,261	5,777	6,317	6,882	7,470		8,718			10,769	11,501	12,257	13,036	13,840 1	14,668 1	15,519	16,395	17,294
	160		140	242	367	514	684	876	, 091	,328	1,588	1,871	2,176	2,504	2,854	3,227			7 084,4		5,428	5,936 (7,020			8,815		10,124 10	10,812	-	12,256 1	13,012 1;	13,791 14	14,592 1	15,416 16	16,262 1
Feet	150		129	224 "	340	478	637	817	,018		1,484, 1		2,034 2	2,340 2		3,017 3		3,779 4		4,625 4		5,555 5	6,052 . 6	6,571 7					9,478 10	10,123 10	10,789 11	11,476 12	12,185 13	12,914 13		14,437 15	15,230 16
Total heightFeet	140		117	206	314	442	590	758	945 1	,152 1		1 .	1,891 2			2,808 3		3,518 3	3,902 4	4,307 4	4,731 5	ſ	5,638 6	6,121 6			7,689 8	8,251 8	8,833 9	9,434 10	10,055 10	11 969,01	11,357 12	12,038 12	12,738 13	13,458 14	14,197 15
Tota	130		106	. 881	288	407	544	669	872	,064 1,	1,274 1,	1,502 1,		2,014 2,		2,599 2,	2,919 3,		3,614 3,	3,989 4,	4,382 4,	4,793 5,	5,223 5,	5,671 6,				7,647 8,	8,187 8,	8,745 9,	9,322 10,	9,916 10,	= "	12	12,	13,	14,
			10												5		.4																				
	120		95	170	262	371	497	639	799	976	1,169	1,379	1,606	1,851	2,112	2,390	2,684	2,996	3,325	3,671		4,412		5,222	5,652	660'9	6,563	7,044	7,542	8,056	8,588	9,136					
	110		48	152	236	335	450	580	726	887	1,064	1,256	1,464	1,687	.1,926	2,180	2,450	2,735	3,036	3,352	3,684	4,031	4,394	4,772	5,166	5,575	000,9										
	100		. 73	134	210	300	403	521	653	664	956	1,133	1,322	1,524	1,741	1,971	2,216	2,475	2,747	3,034	3,335	3,650	3,980	4,323	4,680	5,052	5,437										
	90		.62	116	184	264	357	462	. 580	711	854	1,010	1,179	1,361	1,555	1,762	1,981	2,214	2,459	2,716	2,986	3,269	3,565	3,873	4,194	4,528	4,874										
	8		51	99	. 158	228	310	403	207	623	749	888	1,037	1,198	1,369	1,553	1,747	1,953	2,170	2,398	2,638	2,888															
	70		40	82	132	192	263	344	434	534	549	765	895	1,034	1,184	1,343	1,513	1,692	1,881	2,080	2,289	2,507							,								
	09		33	63	106	157	216	285	361	944	540	642	752	871	. 866		Ì			•														,			
	20		27	45	79	121	170	225	288	358	435	519	610																								
	04		2/23.	30	53	85	123	166	215	270																											
Diameter breast height	inches 1/		22	14	16	100	20 .	22	24	26	28	30	32	34	36	38	40	42	44	94	87	22	52	54	56	58	09	62	49	99	89	70	72	74	76	78	80

 ^{1/} Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9.
 NOTE.--Block indicates extent of data.
 2/ The volume of a tree with a minimum saw log 8 inches d.i.b. and 12 feet long is 23 board feet. Trees lacking this minimum saw log have no Scribner volume.

Stump and top excluded

outside bark 40 50 60 70 inches_L/Y		80 8 8 8 8 8 3 7 1 100 117 117	90 115 222 31 411	100	110	120	130	140	150	160	170	180	190	200	210	220	230	
3 4 4 5 6 6 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6		-	5 9 9 115 22 331 L	9	9		œ	60										240
3 4 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6		-	5 115 31 411 53	9	9		80	00										
5 6 10 12 15 15 21 27 29 35 44 44 53 64 63 75 64 101 119 19 19 19 19 19 19 19 19 19 19 19 1		-	9 15 22 31 41 41			7			σ	6								
23 27 21 25 25 26 44 44 53 64 63 75 64 64 63 75 64 64 65 64 65 64 65 65 66 65 66 65 66 65 66 65 66 65 66 65 66 65 66 65 66 65 66 65 66 65 66 65 66 65 66 65 66 65 65			15 22 31 41 53	10	12	13	14	15	16	17								
12 15 17 21 23 27 29 36 44 44 53 64 53 64 64 63 75 75 64 63 75 75 64 63 75 75 75 130 11			31 41 53	17	19	20	22	24	25	27								
23 27 29 35 44 44 53 64 63 75 64 64 69 61 15 19 19 61 115 115 115 115 115 115 115 115 115			31 411	25	27	30	32	35	37	40								
23 27 29 35 36 44 44 53 53 64 63 75 73 88 11 84 101 1			41 53	35	38	42	45	48	52	55								
29 36 44 44 53 64 63 75 75 75 88 101 115 115 116 116			53	94	20	55	09	49	69	73								
36 44 44 53 53 64 63 75 73 88 84 101 96 115				59	49	70	76	82	88	94								
53 64 63 75 73 88 84 101 96 115			99	73	80	87	95	102	109	117	124	131	139					
53 64 63 75 73 88 84 101 96 115			80	89	98	107	115	124	133	142	151	160	169					
63 75 73 88 84 101 96 115 130			96	106	117	128	138	149	159	170	181	191	202					
88 101 115 130			113	125	138	150	163	175	188	200	213	225	238					
101 115 130			131	146	160	175	190	204	219	233	248	263	277					
115			151	168	185	202	218	235	252	269	286	302	319	336	353	370	386	403
			173	192	211	230	249	268	288	307	326	345	364	383	403	422	441	460
		174	195	217	239	260	282	304	326	347	369	391	412	434	954	477	499	521
	171	195	219	244	268	293	317	341	366	390	415.	439	463	488	512	536	261	585
27	191 2	218	245	272	299	327	354	381	408	436	463	490	517	545	572	599	929	653
21	212 2	242	272	302	332	363	393	423	453	484	514	544	574	409	635	599	.569	725
23	234 2	267	300	334	367	401	434	467	501	534	267	601	634	899	701	734	768	801
225	257 2	294	330	367	404	044	477	514	550	287	624	099	697	734	770	807	844	881
2.5	281 3	321	361	402	442	482	522	562	602	642	683	723	763	803	843	883	924	964
30	306 3		394	438	482	525	569	613	657	700	744	788	832	876	919	963	1,007	1,051
3.5	333 3	380	428	476	523	571	618	999	713	761	808	856	406	951	999	1,046	1,094	1,141
			463	515	995	618	699	721	772	824	875	927	978	1,030	1,081	1,133	1,184	1,236
			500	556	611	199	723	778	834	889	945	1,001	1,056	1,112	1,167	1,223	1,279	1,334
			539	598	658	718	778	838	898	957	1,017	1,077	1,137	1,197	1,257	1,316	1,376	1,436
			578	642	707	771	835	899	496	1,028	1,092	1,156	1,221	1,285	1,349	1,413	1,478	1,542
			619	688	757	826	894	963	1,032	1,101	1,170	1,238	1,307	1,376	1,445	1,514	1,582	1,651
						882	926	1,029	1,103	1,176	1,250	1,323	1,397	1,470	1,544	1,617	1,691	1,765
						941	1,019	1,098	1,176	1,254	1,333	1,411	1,490	1,568	1,646	1,725	1,803	1,882
						,001	1,085	1,168	1,251	1,335	1,418	1,502	1,585	1,669	1,752	1,835	1,919	2,002
					-	1,063	1,152	1,241	1,329	1,418	1,506	1,595	1,684	1,772	1,861	1,950	2,038	2,127
						1,128	1,221	1,315	1,409	1,503	1,597	1,691	1,785	1,879	1,973	2,067	2,161	2,255
								1,392	1,492	1,591	1,691	1,790	1,890	1,989	2,089	2,188	2,288	2,387
								1,472	1,577	1,682	1,787	1,892	1,997	2,102	2,207	2,313	2,418	2,523
								1,553	1,664	1,775	1,886	1,997	2,108	2,219	2,330	2,440	2,551	2,662
								1,637	1,754	1,870	1,987	2,104	2,221	2,338	2,455	2,572	2,689	2,806
								1,722	1,845	1,968	2,091	2,214	2,338	2,461	2,584	2,707		2,953

1/ Diameter classes are midpoint; e.g., [2-inch class includes 11.0-12.9, NOTE.--Block indicates extent of data.

1 94

	230 24											2,881 3,04	3,294 3,48	3,736 3,94	4,205 4,43	4,701 4,958	5,225 5,508	5,777 6,087	6,357 6,691	6,965 7,331	7,600 7,996	8,262 8,691	8,953 9,414	9,671 10,166	10,417 10,947	757,11 061,11	11,991 12,596	12,820 13,463	13,677 14,360	14,561 15,285	15,473 16,240	16,413 17,223	17,380 18,235	18,375 19,276	19,397 20,346	20,448 21,445
	220											2,719	3,112	3,532	3,978	4,451	4,950	5,475	6,027	909'9	7,211	7,842	8,500	9,185	9,896	10,633	11,397	12,187	13,004	13,848	14,718	15,614	16,537	17,486	18,462	19,464
	210											2,562	2,935	3,334	3,757	4,206	4,680	5,180	5,705	6,255	6,830	7,430	8,056	8,707	9,384	10,086	10,812	11,565	12,342	13,145	13,973	14,827	15,705	16,609	17,538	18,493
	200											2,410	2,763	3,141	3,542	3,968	4,417	4,891	5,389	5,910	954.9	7,026	7,620	8,238	8,881	2,547	10,237	10,952	11,690	12,453	13,239	14,050	14,885	15,744	16,627	17,534
	190						936	1,156	1,398	1,663	1,951	2,262	2,596	2,953	3,332	3,735	4,160	4,608	5,079	5,573	6,090	6,629	7,192	7,777	8,386	9,017	9,671	10,348	11,047	11,770	12,516	13,284	14,075	14,889	15,726	16,586
	180						871	1,077	1,305	1,555	1,826	2,119	2,433	2,770	3,127	3,507	3,908	4,331	4,776	5,242	5,730	6,240	6,771	7,324	7,899	8,495	9,113	9,752	10,414	11,097	11,801	12,527	13,275	14,045	14,836	15,649
	170						808	1,001	1,215	1,449	1,704	1,979	2,275	2,591	2,927	3,284	3,662	4,060	4,478	4,917	5,377	5,857	6,357	6,878	7,419	7,890	8,563	9,165	9,788	10,432	11,096	11,780	12,485	13,211	13,957	14,723
يد	160	133	217	321	444	586	747	928	1,128	1,347	1,586	1,843	2,120	2,416	2,732	3,067	3,421	3,794	4,186	4,598	5,029	5,480	6,6,5 °	6,438	946,9	7,473	8,020	8,586	9,171	9,775	10,399	11,042	11,704	12,386	13,086	13,806
Total heightFeet	150	119	197	293	407	539	689	857	1,044	1,248	1,470	1,711	1,969	2,246	2,541	2,853	3,184	3,533	3,900	4,285	4,688	5,109	5,548	9,005	6,480	6,973	7,485	8,014	8,561	9,127	9,710	10,312	10,932	11,569	12,225	12,899
Total he	140	106	178	266	372	464	633	789	962	1,152	1,358	1,582	1,822	2,079	2,353	2,644	2,952	3,276	3,618	3,976	4,351	4,743	5,152	5,578	6,020	6,479	956'9	7,449	7,959	8,485	9,029	9,590	10,167	10,761	11,372	12,000
	130	46	160	241	338	451	579	723	883	1,058	1,249	1,456	1,678	1,916	2,170	2,439	2,724	3,024	3,340	3,672	4,020	4,383	4,762	5,156	5,566	5,992	6,433	6,890	7,363	7,851	8,355	8,874				
	120	83	143	218	306	410	527	099	806	196	1,143	1,333	1,537	1,756	1,990	2,237	2,499	2,776	3,067	3,373	3,693	4,027	4,376	4,739	5,117	5,509	5,916	6,337	6,773	7,223	7,687	8,166				
	110	73	127	195	276	370	477	598	732	879	1,039	1,213	1,399	1,599	1,813	2,039	2,279	2,532	2,798	3,077	3,370	3,676	3,995	4,328	4,673	5,032	5,404									
	100	49	113	174	247	332	429	538	659	792	937	1,095	1,264	1,445	1,638	1,844	2,061	2,291	2;532	2,786	3,051	3,329	3,619	3,920	4,234	4,560	4,898									
	06		66	153	219	295	382	479	588	707	838	979	1,131	1,293	1,467	1,652	1,847	2,053	2,270	2,498	2,736	2,986	3,246	3,517	3,799	4,092	4,395									
	70 80	0 48	4 86	5 134	6 192	4 259	336	7 422	1 519	3 625	4 740	3 865		7 1,144	1,298	4 1,462		5 1,818	3 2,010	0 2,212		8 2,646														
	60 7	34 40	62 74	98 115	991 041	11 224	248 291	312 367	384 451	463 543	449 645	153 753	743 871	15 997	161,131	1,274	1,425	1,585	1,753	1,930	2,115	2,308														
	9 05	27 3		80 9	116 14	161 851	205 24	259 31	318 38	384 46	75 954	533 643	617 74	851	96																					
	04	.21	40	1 49	92	125	163	206	254	306	7																									
Diameter cast height	inches 1/	10	12 "	14	16 91	18	20	22	24	26	30,	3.7	32	3.4	36	38	04	42	智力	94	84	90	52	54	95	58	09	62	49	99	68	70	72	74	76	78

 $\frac{1}{2}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 9.—Board-foot volume of sugar pine by Scribner rule in 16-foot logs to a utilized top

reast height										Total heig	Total height Feet									
inches]	04	909	09	70	80	96	100	110 120	130	140	150	160	160 170	180 190	190	200	210	220	230	240

637 673 826 872 1,094 1,1271 1,341 1,1907 2,100	100 1 001 001 001 001 001 001 000 00 00	00 00 00 00 00 00 00 00 00 00 00 00 00	100 00 00 00 00 00 00 00 00 00 00 00 00	00 30 110 110 120 130 140 150	30 100 150 150 140 150	100 110 120 130 140 150	130 140 150 160	120 140 150 160	150 150 150	140	001	001	-	0/-		08	061	200	210	077	230	240
602 637 673 780 826 872 979 1,037 1,094 1,200 1,271 1,341 1,442 1,527 1,612 1,706 1,806 1,907 2,007 2,107 2,208 2,297 2,433 2,525 2,342 2,459 2,577 2,297 2,433 2,568 2,703 2,838 2,973 2,975 3,150 3,256 2,703 2,483 2,973 2,975 3,150 3,256 2,703 2,483 2,973 4,151 4,395 4,137 4,337 4,144 1,137 4,837 4,154 4,153 4,137 4,397 4,617 4,837 4,566 4,177 4,397 4,617 4,837 4,151 4,395 4,132 4,144 5,935 5,042 5,339 5,665 5,326 5,326 5,326 5,042 5,339 5,62	24 27 12 12 27 27 27 27 27 27 27 27 27 27 27 27 27	10 10 00 00 00 00 00 00 00 00 00 00 00 0	1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,	, , , , , , , , , , , , , , , , , , ,	, , , , , , , , , , , , , , , , , , ,	00000	70 00	,0 ,0	ć	ć	ć		o c									
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2,975 3,150 3,675 3,849 4,024 3,345 3,542 3,739 3,936 4,132 4,329 4,526 3,737 3,957 4,117 4,337 4,617 4,337 5,057 4,151 4,395 4,883 5,128 5,372 5,616 4,586 5,125 5,395 5,625 5,935 6,204 5,042 5,339 5,636 5,932 6,225 6,225 6,225 6,019 6,373 6,727 7,082 7,436 7,796 8,144 6,540 6,925 7,309 7,694 8,079 8,463 8,488 7,645 8,095 8,446 8,095 9,444 9,894 10,344 8,230 8,748 8,955 9,444 9,894 10,344 8,837 9,356 9,878 10,167 11,435 11,356 10,113 10,708 11,303 11,389 12,493 13,688 14,49	1,081 1,235 1,390 1,544 1,699 1,853 2,008 2,162	1,081 1,235 1,390 1,544 1,699 1,853 2,008 2,162	1,081 1,235 1,390 1,544 1,699 1,853 2,008 2,162	1,235 1,390 1,544 1,699 1,853 2,008 2,162	1,390 1,544 1,699 1,853 2,008 2,162	1,544 1,699 1,853 2,008 2,162	1,699 1,853 2,008 2,162	1,853 2,008 2,162	2,008 2,162	2,162		2,316		2,471	2,625	2,780	2,934	3,089	3,243	3,397	3,552	3,706
3,345 3,542 3,739 3,936 4,132 4,329 4,526 3,737 3,957 4,117 4,337 4,617 4,337 5,057 4,151 4,395 4,883 5,128 5,372 5,616 4,586 5,125 5,395 5,625 5,935 6,204 5,042 5,339 5,636 5,932 6,225 6,225 6,225 6,019 6,373 6,727 7,082 7,496 8,079 8,463 8,144 6,540 6,925 7,309 7,694 8,079 8,463 8,488 7,645 8,095 8,545 8,995 9,444 9,894 10,344 8,230 8,714 9,199 9,683 10,167 11,435 11,355 8,837 9,356 9,876 10,396 10,491 11,435 11,356 10,784 11,303 11,389 12,493 13,688 14,590 10,784 11,418 12,526 14,	1,400 1,575 1,750 1,925	1,400 1,575 1,750 1,925 2,100 2,275 2,450	1,400 1,575 1,750 1,925 2,100 2,275 2,450	1,400 1,575 1,750 1,925 2,100 2,275 2,450	1,575 1,750 1,925 2,100 2,275 2,450	1,750 1,925 2,100 2,275 2,450	1,925 2,100 2,275 2,450	2,100 2,275 2,450	2,275 2,450	2,450		2,625		2,800	2,975	3,150	3,325	3,500	3,675	3,849	4,024	4,199
3,737 3,957 4,177 4,397 4,617 4,839 5,128 5,372 5,616 4,586 4,856 5,125 5,395 5,626 5,935 6,204 5,042 5,339 5,636 5,932 6,229 6,525 6,822 5,042 5,339 5,636 5,932 6,225 6,825 6,825 6,019 6,373 6,727 7,082 7,436 7,790 8,144 6,540 6,925 7,309 7,694 8,079 8,463 8,484 7,645 8,095 8,545 8,995 9,444 9,894 10,344 8,230 8,714 9,199 9,683 10,167 11,435 11,355 8,837 9,356 9,876 10,396 10,491 11,435 11,955 9,464 10,021 10,578 11,134 11,691 12,488 13,683 10,113 10,708 11,303 11,898 12,493 13,568 14,550 <td>1,574 1,771 1,968 2,165 2,361</td> <td>1,574 1,771 1,968 2,165 2,361 2,558 2,755</td> <td>1,574 1,771 1,968 2,165 2,361 2,558 2,755</td> <td>1,574 1,771 1,968 2,165 2,361 2,558 2,755</td> <td>1,771 1,968 2,165 2,361 2,558 2,755</td> <td>1,968 2,165 2,361 2,558 2,755</td> <td>2,165 2,361 2,558 2,755</td> <td>2,361 2,558 2,755</td> <td>2,558 2,755</td> <td>2,755</td> <td></td> <td>2,952</td> <td></td> <td>3,149</td> <td>3,345</td> <td>3,542</td> <td>3,739</td> <td>3,936</td> <td>4,132</td> <td>4,329</td> <td>4,526</td> <td>4,723</td>	1,574 1,771 1,968 2,165 2,361	1,574 1,771 1,968 2,165 2,361 2,558 2,755	1,574 1,771 1,968 2,165 2,361 2,558 2,755	1,574 1,771 1,968 2,165 2,361 2,558 2,755	1,771 1,968 2,165 2,361 2,558 2,755	1,968 2,165 2,361 2,558 2,755	2,165 2,361 2,558 2,755	2,361 2,558 2,755	2,558 2,755	2,755		2,952		3,149	3,345	3,542	3,739	3,936	4,132	4,329	4,526	4,723
4,586 4,639 4,883 5,128 5,372 5,616 4,586 4,856 5,125 5,395 5,655 5,935 6,204 5,042 5,339 5,636 5,932 6,229 6,525 6,204 5,042 5,339 5,636 5,932 6,229 6,525 6,822 6,019 6,373 6,727 7,082 7,436 7,790 8,144 6,540 6,925 7,309 7,694 8,079 8,463 8,484 7,645 8,095 8,545 8,995 9,444 9,894 10,344 8,230 8,714 9,199 9,683 10,167 11,435 11,955 8,837 9,356 9,876 10,396 10,916 11,435 11,955 8,837 9,356 9,876 10,396 11,493 11,493 11,493 10,784 11,418 12,053 12,687 13,248 13,688 14,520 11,476 12,151 <td< td=""><td>1,759 1,979 2,198 2,418 2,638 2,858 3,078</td><td>1,759 1,979 2,198 2,418 2,638 2,858 3,078</td><td>1,759 1,979 2,198 2,418 2,638 2,858 3,078</td><td>1,759 1,979 2,198 2,418 2,638 2,858 3,078</td><td>1,979 2,198 2,418 2,638 2,858 3,078</td><td>2,198 2,418 2,638 2,858 3,078</td><td>2,418 2,638 2,858 3,078</td><td>2,638 2,858 3,078</td><td>2,858 3,078</td><td>3,078</td><td></td><td>3,298</td><td>~</td><td>3,518</td><td>3,737</td><td>3,957</td><td>4,177</td><td>4,397</td><td>4,617</td><td>4,837</td><td>5,057</td><td>5,276</td></td<>	1,759 1,979 2,198 2,418 2,638 2,858 3,078	1,759 1,979 2,198 2,418 2,638 2,858 3,078	1,759 1,979 2,198 2,418 2,638 2,858 3,078	1,759 1,979 2,198 2,418 2,638 2,858 3,078	1,979 2,198 2,418 2,638 2,858 3,078	2,198 2,418 2,638 2,858 3,078	2,418 2,638 2,858 3,078	2,638 2,858 3,078	2,858 3,078	3,078		3,298	~	3,518	3,737	3,957	4,177	4,397	4,617	4,837	5,057	5,276
4,586 4,856 5,125 5,395 5,665 5,935 6,204 5,042 5,339 5,636 5,932 6,229 6,525 6,822 5,520 5,845 6,170 6,494 6,819 7,144 7,468 6,019 6,373 6,727 7,082 7,436 7,790 8,144 7,082 7,499 7,915 8,332 8,748 9,165 9,581 7,645 8,095 8,545 8,995 9,444 9,894 10,344 8,230 8,714 9,199 9,683 10,167 11,435 11,955 8,837 9,356 9,876 10,396 10,916 11,435 11,955 9,464 10,021 10,578 11,134 11,691 12,488 13,683 10,784 11,418 12,053 12,687 13,321 13,586 14,590 11,476 12,151 12,826 13,501 14,176 14,891 15,526 12,924	1,953 2,198 2,442 2,686 2,930 3,174 3,418	1,953 2,198 2,442 2,686 2,930 3,174 3,418	1,953 2,198 2,442 2,686 2,930 3,174 3,418	1,953 2,198 2,442 2,686 2,930 3,174 3,418	2,198 2,442 2,686 2,930 3,174 3,418	2,442 2,686 2,930 3,174 3,418	2,686 2,930 3,174 3,418	2,930 3,174 3,418	3,174 3,418	3,418		3,663	~	3,907	4,151	4,395	4,639	4,883	5,128	5,372	5,616	5,860
5,042 5,339 5,636 5,932 6,229 6,525 6,822 5,520 5,845 6,170 6,494 6,819 7,144 7,468 6,019 6,373 6,727 7,082 7,436 7,790 8,144 7,082 7,499 7,915 8,332 8,748 9,165 9,581 7,645 8,095 8,545 8,995 9,444 9,894 10,344 8,230 8,714 9,199 9,683 10,167 11,435 11,955 8,837 9,356 9,876 10,396 10,464 9,894 10,344 8,837 9,356 9,876 10,396 11,134 11,691 12,248 12,805 10,113 10,708 11,303 11,898 12,493 13,683 14,590 11,476 12,151 12,826 13,321 13,956 14,520 11,468 12,906 13,623 14,340 15,057 15,774 16,491 12,924	2,158 2,428 2,698 2,967 3,237 3,507 3,777	2,158 2,428 2,698 2,967 3,237 3,507 3,777	2,158 2,428 2,698 2,967 3,237 3,507 3,777	2,158 2,428 2,698 2,967 3,237 3,507 3,777	2,428 2,698 2,967 3,237 3,507 3,777	2,698 2,967 3,237 3,507 3,777	2,967 3,237 3,507 3,777	3,237 3,507 3,777	3,507 3,777	3,777		4,046		4,316	4,586	4,856	5,125	5,395	5,665	5,935	6,204	6,474
5,520 5,845 6,170 6,494 6,819 7,144 7,468 6,019 6,373 6,727 7,082 7,436 7,790 8,144 7,082 7,499 7,915 8,332 8,748 9,165 9,581 7,082 7,499 7,915 8,332 8,748 9,165 9,581 7,645 8,095 8,545 8,995 9,444 9,894 10,344 8,230 8,714 9,199 9,683 10,167 11,435 11,955 8,837 9,356 9,876 10,396 10,916 11,435 11,955 9,464 10,021 10,578 11,134 11,691 12,248 12,805 10,133 11,303 11,898 12,493 13,683 14,590 11,476 12,151 12,826 13,521 14,691 15,526 11,469 12,906 13,623 14,340 15,057 15,774 16,491 12,924 13,684 14,444 </td <td>2,373 2,669 2,966 3,263 3,559 3,856 4,152</td> <td>2,669 2,966 3,263 3,559 3,856 4,152</td> <td>2,966 3,263 3,559 3,856 4,152</td> <td>3,263 3,559 3,856 4,152</td> <td>3,559 3,856 4,152</td> <td>3,856 4,152</td> <td>4,152</td> <td></td> <td>4,449</td> <td></td> <td>942,4</td> <td>5,045</td> <td>5,339</td> <td>5,636</td> <td>5,932</td> <td>6,229</td> <td>6,525</td> <td>6,822</td> <td>7,119</td>	2,373 2,669 2,966 3,263 3,559 3,856 4,152	2,373 2,669 2,966 3,263 3,559 3,856 4,152	2,373 2,669 2,966 3,263 3,559 3,856 4,152	2,373 2,669 2,966 3,263 3,559 3,856 4,152	2,669 2,966 3,263 3,559 3,856 4,152	2,966 3,263 3,559 3,856 4,152	3,263 3,559 3,856 4,152	3,559 3,856 4,152	3,856 4,152	4,152		4,449		942,4	5,045	5,339	5,636	5,932	6,229	6,525	6,822	7,119
6,540 6,323 6,727 7,082 7,436 7,790 8,144 6,540 6,925 7,309 7,694 8,079 8,463 8,848 7,082 7,499 7,915 8,332 8,748 9,165 9,581 7,645 8,095 8,545 8,995 9,444 9,894 10,344 8,230 8,714 9,199 9,683 10,167 10,651 11,135 8,837 9,356 9,876 10,396 10,916 11,435 11,955 9,464 10,021 10,578 11,134 11,691 12,248 12,805 10,784 11,418 12,053 12,687 13,321 13,956 14,590 11,476 12,151 12,826 13,501 14,176 14,851 15,526 12,189 12,906 13,623 14,340 15,057 15,774 16,491 12,924 13,684 14,444 15,205 15,965 16,725 17,485 13,680 14,485 15,290 16,094 16,899 17,704 18,506 14,458 15,308 16,159 17,009 17,859 18,710 19,560 15,525 16,5257 16,154 17,052 17,949 18,847 19,744 20,641	2,598 2,922 3,247 3,572 3,897 4,221 4,546	2,598 2,922 3,247 3,572 3,897 4,221 4,546	2,598 2,922 3,247 3,572 3,897 4,221 4,546	2,598 2,922 3,247 3,572 3,897 4,221 4,546	2,922 3,247 3,572 3,897 4,221 4,546	3,247 3,572 3,897 4,221 4,546	3,572 3,897 4,221 4,546	3,897 4,221 4,546	4,221 4,546	4,546		4,87	-	5,195	5,520	5,845	6,170	6,494	6,819	7,144	7,468	7,793
6,540 6,925 7,309 7,694 8,079 8,463 8,848 7,082 7,499 7,915 8,332 8,748 9,165 9,581 7,645 8,095 8,546 8,995 9,444 9,894 10,344 8,230 8,714 9,199 9,683 10,167 11,135 11,135 8,837 9,356 9,876 10,396 10,916 11,435 11,955 9,464 10,021 10,578 11,134 11,691 12,248 12,805 10,113 10,708 11,303 11,898 12,493 13,683 14,590 11,476 12,151 12,826 13,501 14,176 14,590 14,590 12,924 13,684 14,444 15,205 15,965 16,725 17,485 13,680 14,485 15,200 16,094 16,899 17,704 18,560 14,458 15,308 16,995 17,704 18,560 14,458 15,308	4,249 4,603 4,957	3,541 3,895 4,249 4,603 4,957	3,541 3,895 4,249 4,603 4,957	3,541 3,895 4,249 4,603 4,957	3,541 3,895 4,249 4,603 4,957	3,541 3,895 4,249 4,603 4,957	3,895 4,249 4,603 4,957	4,249 4,603 4,957	4,603 4,957	4,957		5,31	_	5,665	6,019	6,373	6,727	7,082	7,436	7,790	8,144	8,498
7,082 7,499 7,915 8,332 8,748 9,165 9,581 7,645 8,095 8,545 8,995 9,444 9,894 10,344 8,230 8,714 9,199 9,683 10,167 10,651 11,135 8,837 9,356 9,876 10,396 10,916 11,435 11,955 9,464 10,021 10,578 11,134 11,691 12,248 12,805 10,113 10,708 11,303 11,898 12,493 13,683 14,590 11,476 12,151 12,826 13,501 14,176 14,590 14,590 12,189 12,906 13,623 14,340 15,057 15,774 16,491 12,924 13,684 14,444 15,205 15,965 16,725 17,485 13,680 14,485 15,200 16,094 16,899 17,704 18,506 14,458 15,308 16,159 17,009 17,859 18,710 19,560	3,847 4,232 4,616 5,001	3,847 4,232 4,616 5,001 5,386	3,847 4,232 4,616 5,001 5,386	3,847 4,232 4,616 5,001 5,386	3,847 4,232 4,616 5,001 5,386	3,847 4,232 4,616 5,001 5,386	4,232 4,616 5,001 5,386	4,616 5,001 5,386	5,001 5,386	5,386		5,77	0	6,155	0,540	6,925	7,309	7,694	8,079	8,463	8,848	9,233
7,645 8,095 8,546 8,995 9,444 9,894 10,344 8,230 8,714 9,199 9,683 10,167 10,651 11,135 8,837 9,356 9,876 10,396 10,916 11,435 11,955 9,464 10,021 10,578 11,134 11,691 12,248 12,805 10,133 10,784 11,303 11,898 12,493 13,088 13,683 11,476 12,151 12,826 13,501 14,176 14,590 14,590 12,189 12,906 13,623 14,340 15,057 15,774 16,491 12,924 13,684 14,444 15,205 15,965 16,725 17,485 13,680 14,485 15,290 16,094 16,899 17,704 18,508 14,458 15,308 16,159 17,009 17,859 18,710 19,560 15,257 16,159 17,094 18,847 19,744 20,641 20,641 <	4,166 4,582 4,999 5,416 5,832	4,166 4,582 4,999 5,416 5,832	4,166 4,582 4,999 5,416 5,832	4,166 4,582 4,999 5,416 5,832	4,166 4,582 4,999 5,416 5,832	4,166 4,582 4,999 5,416 5,832	4,582 4,999 5,416 5,832	4,999 5,416 5,832	5,416 5,832	5,832		6,24	σ.	9,665	7,082	7,499	7,915	8,332	8,748	9,165	9,581	9,998
8,230 8,714 9,199 9,683 10,167 10,651 11,135 8,837 9,356 9,876 10,396 10,916 11,435 11,955 9,464 10,021 10,578 11,134 11,691 12,248 12,805 10,113 10,708 11,303 11,898 12,493 13,088 13,683 10,784 11,418 12,053 12,687 13,321 13,956 14,590 11,476 12,151 12,826 13,501 14,176 14,691 15,526 12,924 13,684 14,444 15,205 15,965 16,725 17,485 13,680 14,485 15,290 16,094 16,899 17,704 18,560 14,458 15,308 16,159 17,009 17,859 18,710 19,560 15,257 16,154 17,052 17,849 19,744 20,641	4,497 4,947 5,397 5,846 6,296	4,497 4,947 5,397 5,846 6,296	4,497 4,947 5,397 5,846 6,296	4,497 4,947 5,397 5,846 6,296	4,497 4,947 5,397 5,846 6,296	4,497 4,947 5,397 5,846 6,296	4,947 5,397 5,846 6,296	5,397 5,846 6,296	5,846 6,296	6,296	ī	6,74	9	7,196	7,645	8,095	8,545	8,995	9,444	9,894	10,344	10,793
8,837 9,356 9,876 10,396 10,916 11,435 11,955 9,464 10,021 10,578 11,134 11,691 12,248 12,805 10,113 10,708 11,303 11,898 12,493 13,088 13,683 10,784 11,418 12,053 12,687 13,321 13,956 14,590 11,476 12,151 12,826 13,501 14,176 14,851 15,526 12,906 13,623 14,340 15,057 15,774 16,491 12,924 13,684 14,444 15,205 15,965 16,725 17,704 18,508 14,458 15,308 16,159 17,009 17,859 18,710 19,560 15,257 16,154 17,052 17,949 18,847 19,744 20,641	4,841 5,325 5,810 6,294 6,778	4,841 5,325 5,810 6,294 6,778	4,841 5,325 5,810 6,294 6,778	4,841 5,325 5,810 6,294 6,778	4,841 5,325 5,810 6,294 6,778	4,841 5,325 5,810 6,294 6,778	5,325 5,810 6,294 6,778	5,810 6,294 6,778	6,294 6,778	6,778		7,26	2	7,746	8,230	8,714	9,199	9,683	10,167	10,651	11,135	11,619
9,464 10,021 10,578 11,134 11,691 12,248 12,805 10,113 10,708 11,303 11,898 12,493 13,088 13,683 10,784 11,418 12,053 12,687 13,321 13,956 14,590 11,476 12,151 12,826 13,501 14,176 14,851 15,526 12,906 13,623 14,340 15,057 15,774 16,491 12,924 13,684 14,444 15,205 15,965 16,725 17,704 18,508 14,48 15,209 17,859 18,710 19,560 14,458 15,308 16,159 17,009 17,859 18,710 19,560 15,257 16,154 17,052 17,949 18,847 19,744 20,641	6,238 6,757 7,277	6,238 6,757 7,277	6,238 6,757 7,277	6,238 6,757 7,277	6,238 6,757 7,277	6,238 6,757 7,277	6,238 6,757 7,277	6,757 7,277	6,757 7,277	7,277	\neg	7,79	7	8,317	8,837	9,356	9,876	10,396	10,916	11,435	11,955	12,475
10,113 10,708 11,303 11,898 12,493 13,088 13,683 10,784 11,418 12,053 12,687 13,321 13,956 14,590 11,476 12,151 12,826 13,501 14,176 14,851 15,526 12,924 13,684 14,444 15,205 15,965 16,725 17,485 13,680 14,485 15,290 16,094 16,899 17,704 18,508 14,458 15,308 16,159 17,009 17,859 18,710 19,560 15,257 16,154 17,052 17,949 18,847 19,744 20,641	7,237 7,794	7,237 7,794	7,237 7,794	7,237 7,794	7,237 7,794	7,237 7,794	7,237 7,794	7,237 7,794	7,237 7,794	7,794		8,35	_	8,907	9,464	10,021	10,578	11,134	11,691	12,248	12,805	13,361
10,784 11,418 12,053 12,687 13,321 13,956 14,590 11,476 12,151 12,826 13,501 14,176 14,851 15,526 12,924 13,684 14,444 15,205 15,965 16,725 17,448 13,680 14,485 15,290 16,094 16,899 17,704 18,508 14,458 15,308 16,159 17,009 17,859 18,710 19,560 15,257 16,154 17,052 17,949 18,847 19,744 20,641	8,329	7,734 8,329	7,734 8,329	7,734 8,329	7,734 8,329	7,734 8,329	7,734 8,329	7,734 8,329	7,734 8,329	8,329		8,921	_	9,518	10,113	10,708	11,303	11,898	12,493	13,088	13,683	14,278
11,476 12,151 12,826 13,501 14,176 14,851 15,526 12,189 12,906 13,623 14,340 15,057 15,774 16,491 12,924 13,684 14,444 15,205 15,965 16,725 17,485 13,680 14,485 15,290 16,094 16,899 17,704 18,508 14,458 15,308 16,159 17,009 17,859 18,710 19,560 15,257 16,154 17,052 17,949 18,847 19,744 20,641	8,881	8,246 8,881	8,246 8,881	8,246 8,881	8,246 8,881	8,246 8,881	8,246 8,881	8,246 8,881	8,246 8,881	8,881	- 1	9,515		10,149	10,784	11,418	12,053	12,687	13,321	13,956	14,590	15,224
12,189 12,906 13,623 14,340 15,057 15,774 16,491 12,924 13,684 14,444 15,205 15,965 16,725 17,485 13,680 14,485 15,290 16,094 16,899 17,704 18,508 14,458 15,308 16,159 17,009 17,859 18,710 19,560 15,257 16,154 17,052 17,949 18,847 19,744 20,641	8,776 9,451	8,776 9,451	8,776 9,451	8,776 9,451	8,776 9,451	8,776 9,451	8,776 9,451	8,776 9,451	8,776 9,451	9,451		10,126		10,801	11,476	12,151	12,826	13,501	14,176	14,851	15,526	16,201
12,924 13,684 14,444 15,205 15,965 16,725 17,485 13,680 14,485 15,290 16,094 16,899 17,704 18,508 14,458 15,308 16,159 17,009 17,859 18,710 19,560 15,257 16,154 17,052 17,949 18,847 19,744 20,641	,	,	,	,	,	,	,	,	,	,	,	10,755		11,472	12,189	12,906	13,623	14,340	15,057	15,774	16,491	17,208
13,680 14,485 15,290 16,094 16,899 17,704 18,508 14,458 15,308 16,159 17,009 17,859 18,710 19,560 15,257 16,154 17,052 17,949 18,847 19,744 20,641	10,643 11,403											11,403		12,164	12,924	13,684	14,444	15,205	15,965	16,725	17,485	18,246
14,458 15,308 16,159 17,009 17,859 18,710 19,560 15,257 16,154 17,052 17,949 18,847 19,744 20,641												12,071		12,875	13,680	14,485	15,290	16,094	16,899	17,704	18,508	19,313
15,257 16,154 17,052 17,949 18,847 19,744 20,641												12,757	_	13,607	14,458	15,308	16,159	17,009	17,859	18,710	19,560	20,411
												13,462		14,359	15,257	16,154	17,052	17,949	18,847	19,744	20,641	21,539

 $\frac{1}{2}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 10.—Cubic-foot volume of lodgepole pine

Top diameter, A Inches Stump height, I foot

Diameter reast height							Total he	ightFe	et				
utside bark inches	40	50	60	70	80	90	100	110	120	130	140	150	160
6	3	4	5	5	6	6	6						
8	6	7	8	9	10	11	12						
10	9	11	13	15	17	18	20	21	22	23	23	25	26
12	- 13	16	19	22	25	27	29	31	33	34	35	36	38
14	17	21	26	30	34	37	41	43	46	48	50	52	53
16	22	28	34	39	44	49	54	58	62	65	68	71	73
18	28	35	42	49	57	63	69	74	79	84	88	92	95
20	35	44	52	61	70	78	86	93	99	105	111	116	120
22	42	53	63	74	84	95	104	113	121	129	136	143	148
24	50	63	75	88	101	113	125	135	146	155	164	172	180
26	59	74	88	103	118	133	147	160	172	184	194	204	214
28		86	103	120	137	154	171	186	201	214	227	240	251
30 .		98	118	137	157	177	196	215	232	248	263	277	291
32 .		112	134	156	179	201	223	245	265	283	301	318	334
34			151	177	202	227	252	277	300	322	342	361	380
36			170	198	226	254	283	311	338	362	385	408	429
38				221	252	284	315	347	378	405	431	457	481
40				244	279	314	349	384	419	450	480	508	536
42				269	308	346	385	423	462	498	531	563	593
Li Li				296	338	380	422	465	507	548	585	620	654
46				323	369	415	462	508	554	600	641	680	718
48				352	402	452	503	553	603	653	700	743	784
50				382	436	491	545	600	654	709	761	808	854

 $[\]frac{1}{2}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 11.—Board-foot volume of lodgepole pine by International 1/4-inch rule

Stump and top excluded

Top diameter, 6.5 inches

Stump and top ex	cruded										\$t	ump neign	t, I foot
Diameter breast height outside bark							Total h	eightF	eet				
inches_1/	40	50	60	70	80	90	100	110	120	130	140	150	160
												-	
10	23	39	55	70	86	101	117						
12	43	66	88	110	133	155	178	200	223	245	268	290	313
14	68	98	129	159	190	221	251	282	312	343	374	404	435
16	97	137	177	217	257	297	337	377	417	457	497	537	577 ·
18 .	132	183	233	284	334	385	436	486	537	587	638	688	739
20	172	234	297	359	421	484	546	609	671	734	796	859	921
22	216	292	367	443	519	594	670	745	821	896	972	1,048	1,123
24	266	356	446	536	626	716	805	895	985	1,075	1,165	1,255	1,345
26	321	426	532	637	743	848	954	1,059	1,165	1,270	1,376	1,482	1,587
28		503	625	747	870	992	1,115	1,237	1,359	1,482	1,604	1,727	1,849
30		585	726	866	1,007	1,147	1,288	1,428	1,569	1,709	1,850	1,990	2,131
32		674	834	994	1,154	1,314	1,474	1,634	1,793	1,953	2,113	2,273	2,433
34			950	1,131	1,311	1,491	1,672	1,852	2,033	2,213	2,394	2,574	2,755
36			1,073	1,276	1,478	1,680	1,883	2,085	2,287	2,490	2,692	2,894	3,097
38				1,430	1,655	1,881	2,106	2,331	2,557	2,782	3,008	3,233	3,459
40				1,592	1,842	2,092	2,342	2,592	2,841	3,091	3,341	3,591	3,841
42				1,764	2,039	2,315	2,590	2,865	3,141	3,416	3,692	3,967	4,242
44				1,944	2,246	2,548	2,851	3,153	3,455	3,757	4,060	4,362	4,664
46				2,133	2,463	2,794	3,124	3,454	3,785	4,115	4,445	4,776	5,106
48				2,330	2,690	3,050	3,410	3,769	4,129	4,489	4,848	5,208	5,568
50				2,537	2,927	3,317	3,708	4,098	4,488	4,879	. 5,269	5,659	6,050

 $[\]frac{1}{-}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 12.—Board-foot volume of lodgepole pine by Scribner rule in 16-foot logs to a utilized top

Stump and top e	xcluded										To S	p diamete tump heig	r, variabl
Diameter breast height							Total h	elghtF	cet				
outside bark inches <u>l</u> /	40	50	60	70	80	90	100	110	120	130	140	150	160
12	27	48	68	89	110	130	151	172	192	213	234	254	275
14	48	76	104	132	160	188	216	244	272	301	329	357	385
16	73	109	146	183	220	256	293	330	367	403	440	477	513
18	102	149	195	242	288	335	381	428	474	521	567	614	660
20	137	194	252	309	366	424	481	538	596	653	711	768	825
22	176	245	315	384	453	523	592	662	731	801	870	940	1,009
24	219	302	384	467	550	632	715	798	880	963	1,046	1,128	1,211
26	267	364	461	558	655	752	849	946	1,043	1,140	1,237	1,334	1,431
28		432	545	657	770	882	995	1,107	1,220	1,332	1,445	1,557	1,670
30		506	636	765	894	1,023	1,152	1,281	1,410	1,539	1,669	1,798	1,927
32		586	733	880	1,027	1,174	1,321	1,468	1,615	1,761	1,908	2,055	2,202
34			837	1,003	1,169	1,335	1,501	1,667	1,832	1,998	2,164	2,330	2,496
36			949	1,135	1,320	1,506	1,692	1,878	2,064	2,250	2,436	2,622	2,808
38				1,274	1,481	1,688	1,895	2,103	2,310	2,517	2,724	2,931	3,138
40				1,421	1,651	1,880	2,110	2,340	2,569	2,799	3,028	3,258	3,487
42				1,577	1,830	2,083	2,336	2,589	2,842	3,095	3,348	3,601	3,854
I ₄ I ₄				1,740	2,018	2,296	2,573	2,851	3,129	3,407	3,684	3,962	4,240
46				1,912	2,215	2,519	2,822	3,126	3,430	3,733	4,037	4,340	4,644
48				2,091	2,422	2,752	3,083	3,413	3,744	4,075	4,405	4,736	5,066
50				2,279	2,637	2,996	3,355	3,713	4,072	4,431	4,789	5,148	5,507

 $[\]frac{1}{-}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

1	Diameter breast height											Total hei	Total heightFeet									
1	outside bark inches 1/	40	50	09	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
1 14 15 15 15 15 14 15 15																						
1 16 10 10 11 12 13 15 13 14 15 15 15 15 15 15 15	9	~	~	4	2	2	9	7	7	00	σι	6	10	10								
1 1 1 1 1 1 1 1 1 1	œ	2	9	7	00	10	Ξ	12	13	14	15	16	17	19								
1 14 15 15 15 15 15 15	10	00	6	11	13	15	17	18	20	22	24	26	27	29								
15 16 16 17 17 17 17 17 17	12	=	14	16	19	21	24	27	29	32	34	37	39	42								
1	14	15	18	22	26	29	33	36	40	43	747	20	54	57								
	16	19	24	29	33	38	43	47	52	95	61	65	70	74								
1	18	24	30	36	42	84	54	09	99	17	77	83	89	46								
1,	20	30	38	45	52	09	19	74	81	88	95	102	109	116	123	130	137					
	22	36	45	54	63	72	81	90	98	107	115	124	132	141	149	157	165					
51 63 64 76 88 110 113 112 113 112 113 114 120 116 113 114 220 226 229 237 238 233 358 358 358 358 358 358 358 358 358 358 358 358 358 358 358 358 359 419 419 419 260 229 239 419	24	43	54	65	75	98	96	107	117	127	137	147	157	167	177	187	197					
	26	51	63	9/	88	101	113	125	137	149	161	173	185	196	208	220	231					
	28		74	88	102	117	131	145	159	173	187	200	214	228	241	255	268					
96 115 134 152 171 189 228 225 245 245 326 316 326 316 326 315 315 315 315 315 315 315 315 315 315	30		84	101	118	134	150	. 166	183	198	214	230	246	261	277	292	308	323	338	353	368	382
130 151 172 193 214 234 255 256 316 316 316 316 316 315 315 315 413 444	32		96	115	134	152	171	189	208	226	244	262	280	297	315	333	350	367	384	401	418	435
146 169 193 216 240 263 286 334 369 334 369 334 369 334 369 334 369 334 369 334 369 334 369 334 369 334 369 334 369 334 369 334 369 334 369 334 369 334 369 334 369 349 465 465 565 565 567 567 569 567 569 567 569 567 569	34			130	151	172	193	214	234	255	275	296	316	336	356	375	395	415	434	453	472	491
189 215 241 267 226 324 344 405 419 444 469 493 519 514 514	36			146	169	193	216	240	263	286	309	331	354	376	399	421	443	465	486	508	529	551
299 238 247 256 324 353 381 409 437 465 492 573 653 653 651 652 <td>38</td> <td></td> <td></td> <td></td> <td>189</td> <td>215</td> <td>241</td> <td>267</td> <td>293</td> <td>318</td> <td>344</td> <td>369</td> <td>394</td> <td>419</td> <td>444</td> <td>694</td> <td>493</td> <td>518</td> <td>545</td> <td>995</td> <td>590</td> <td>614</td>	38				189	215	241	267	293	318	344	369	394	419	444	694	493	518	545	995	590	614
230 263 3294 326 359 451 461 461 461 461 461 461 462 512 543 663 663 673 663 673 663 673 663 673 753 759 794 773 783 783 783 863 864 864 673 663 763 763 763 784 783 864 864 863 663 773 784 784 889 864 863 864 864 863 864 864 863 864 <td>40</td> <td></td> <td></td> <td></td> <td>209</td> <td>238</td> <td>267</td> <td>296</td> <td>324</td> <td>353</td> <td>381</td> <td>604</td> <td>437</td> <td>465</td> <td>492</td> <td>520</td> <td>247</td> <td>574</td> <td>601</td> <td>627</td> <td>654</td> <td>680</td>	40				209	238	267	296	324	353	381	604	437	465	492	520	247	574	601	627	654	680
253 288 333 447 461 495 529 569 659 669 709 748 773 759 791 789 759 781 789 669 709 748 789 789 864 864 789 789 864 869 789 789 884 860 984 864 860 1,021 1,02	42				230	263	294	326	358	389	420	451	482	512	543	573	603	633	662	169	721	750
276 315 353 391 429 467 578 615 687 728 779 778 779 779 748 779 779 748 779 748 779 748 779 748 779 749 789 689 629 629 629 629 629 629 789 <td>44</td> <td></td> <td></td> <td></td> <td>253</td> <td>288</td> <td>323</td> <td>358</td> <td>393</td> <td>427</td> <td>461</td> <td>495</td> <td>529</td> <td>562</td> <td>965</td> <td>629</td> <td>662</td> <td>469</td> <td>727</td> <td>759</td> <td>791</td> <td>823</td>	44				253	288	323	358	393	427	461	495	529	562	965	629	662	469	727	759	791	823
311 343 386 426 467 598 659 799 748 787 884 896 938 941 971 984 989 938 941 986 989 989 1021 1	94				276	315	353	391	429	467	504	541	578	615	651	687	723	759	794	829	498	899
327 372 447 462 596 683 726 769 882 882 884 894 996 1,005 1,005 1,005 1,005 1,005 1,005 1,005 1,005 1,005 1,005 1,105 1,005 1,005 1,005 1,105 1,005 1,005 1,105 1,005 1,005 1,105 1,105 1,005 1,105 1,105 1,005 1,101 1,101 1,105 1,105 1,005 1,413 1,505 1,105 1,413 1,505 1,405 1,405 1,405 1,405 1,405 1,	48				301	343	385	426	194	508	549	589	629	699	709	748	787	826	865	903	941	979
451 500 548 596 644 692 739 785 832 878 974 977 1015 1,005 1,105 1	90				327	372	417	462	207	551	965	639	683	726	692	812	854	968	938	980	1,021	1,062
487 539 591 643 695 746 897 947 996 1,046 1,046 1,046 1,046 1,046 1,046 1,012 1,125 1,137 1,191 1,191 965 1,012 1,115 1,177 1,229 1,281 1,191 1,191 965 1,032 1,126 1,126 1,127 1,129 1,131 1,131 1,132 1,126 1,129 1,131 1,131 1,131 1,131 1,132 1,126 1,129 1,131 1,131 1,132 1,132 1,131 1,131 1,131 1,132 1,132 1,131 1,131 1,131 1,131 1,131 1,131 1,131 1,131 1,143 1,443 1,531 1,441 1,471 1,471 1,443 1,521 1,441 1,471 1,441 1,471 1,441 1,443 1,521 1,443 1,521 1,443 1,521 1,443 1,443 1,423 1,526 1,443 1,423 1,526 <t< td=""><td>52</td><td></td><td></td><td></td><td></td><td></td><td>451</td><td>200</td><td>548</td><td>965</td><td>449</td><td>692</td><td>739</td><td>785</td><td>832</td><td>878</td><td>924</td><td>970</td><td>1,015</td><td>1,060</td><td>1,105</td><td>1,149</td></t<>	52						451	200	548	965	449	692	739	785	832	878	924	970	1,015	1,060	1,105	1,149
524 580 636 692 747 802 857 911 965 1,072 1,175 1,125 1,177 1,229 1,281 562 622 682 742 801 860 919 977 1,035 1,169 1,169 1,169 1,169 1,170 1,183 1,248 1,248 1,314 1,374 1,471 1,471 903 976 1,048 1,119 1,190 1,265 1,489 1,527 1,413 1,475 1,489 1,560 1,570 1,779 <td< td=""><td>54</td><td></td><td></td><td></td><td></td><td></td><td>487</td><td>539</td><td>591</td><td>643</td><td>695</td><td>246</td><td>797</td><td>847</td><td>897</td><td>246</td><td>966</td><td>1,046</td><td>1,094</td><td>1,143</td><td>1,191</td><td>1,239</td></td<>	54						487	539	591	643	695	246	797	847	897	246	966	1,046	1,094	1,143	1,191	1,239
562 622 682 742 801 860 919 977 1,035 1,105	56						524	580	636	692	747	802	857	911	965	1,018	1,072	1,125	1,177	1,229	1,281	1,332
601 666 730 794 858 921 983 1,046 1,108 1,169 1,230 1,291 1,351 1,411 1,471 1,471 1,471 1,481 1,570 1,248 1,314 1,482 1,507 1,570 1,570 1,570 1,020 1,020 1,101 1,183 1,267 1,582 1,588 1,423 1,502 1,580 1,678 1,777 1,889 1,921 2,002 1,381 1,481 1,481 1,167 1,253 1,381 1,423 1,582 1,684 1,771 1,889 1,921 2,002 1,381 1,490 1,496 1,597 1,694 2,055 2,146 2,237 1,400 1,496 1,577 1,876 1,974 2,071 2,168 2,264 2,359 1,570 1,777 1,875 1,	58						562	622	682	742	801	860	919	277	1,035	1,092	1,150	1,206	1,263	1,319	1,374	1,429
848 916 983 1,050 1,117 1,183 1,248 1,314 1,378 1,443 1,570 1,570 903 976 1,048 1,119 1,120 1,260 1,460 1,469 1,537 1,463 1,577 1,677 1,777 961 1,020 1,101 1,183 1,263 1,340 1,489 1,562 1,638 1,777 1,777 1,777 1,777 1,777 1,777 1,777 1,777 1,889 1,921 2,002 2,188 2,002 2,118 2,002 2,118 2,002 2,118 2,002 2,118 2,002 2,118 2,002 2,118 2,002 2,118 2,002 2,18 2,002 2,118 2,002 2,118 2,002 2,118 2,002 2,118 2,002 2,118 2,002 2,118 2,002 2,118 2,18 2,18 2,18 2,18 2,18 2,18 2,18 2,18 2,18 2,18 2,26 2,48 2,37 2,18 2,48 2,18 2,49 2,614 2,59 2,14	09						601	999	730	794	858	921	983	1,046	1,108	1,169	1,230	1,291	1,351	1,411	1,471	1,530
903 976 1,048 1,119 1,126 1,260 1,330 1,400 1,469 1,537 1,605 1,673 1,779 1,779 1,020 1,020 1,101 1,118 1,263 1,340 1,423 1,562 1,580 1,658 1,736 1,779 1,779 1,081 1,167 1,253 1,348 1,423 1,502 1,580 1,678 1,777 1,889 1,921 2,002 1,380 1,081 1,167 1,253 1,348 1,423 1,508 1,591 1,674 1,757 1,839 1,921 2,002 1,380 1,400 1,496 1,591 1,685 1,778 1,879 1,964 2,055 2,146 2,237 1,400 1,477 1,578 1,677 1,876 1,974 2,071 2,168 2,264 2,359 1,575 1,677 1,875 1,875 1,875 1,976 2,079 2,182 2,283 2,485 1,575 1,677 1,875 1,875 1,875 1,875 1,976 2,079 2,182 2,283 2,485 2,485 1,575 1,677 1,875 1,875 1,875 2,187 2,295 2,402 2,509 2,614 3	62									848	916	983	1,050	1,117	1,183	1,248	1,314	1,378	1,443	1,507	1,570	1,633
961 1,038 1,114 1,190 1,265 1,340 1,415 1,402 1,562 1,635 1,707 1,779 1,779 1,020 1,020 1,101 1,1183 1,263 1,423 1,502 1,502 1,580 1,658 1,716 1,819 1,921 2,002 1,081 1,167 1,253 1,318 1,423 1,508 1,591 1,674 1,777 1,839 1,921 2,002 1,1326 1,416 1,506 1,595 1,684 1,771 1,859 1,946 2,032 2,118 1,400 1,496 1,591 1,688 1,777 1,876 1,977 1,978 2,264 2,359 1,547 1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,283 2,385 2,485 1,556 1,637 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509 2,614	49									903	976	1,048	1,119	1,190	1,260	1,330	1,400	1,469	1,537	1,605	1,673	1,740
1,020 1,101 1,183 1,263 1,343 1,423 1,508 1,508 1,658 1,777 1,839 1,921 2,002 1,081 1,167 1,253 1,338 1,423 1,508 1,591 1,674 1,777 1,889 1,946 2,032 2,118 1,400 1,496 1,591 1,685 1,777 1,876 1,976 2,077 2,168 2,244 2,359 1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,283 2,385 2,485 1,637 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509 2,614	99									961	1,038	1,114	1,190	1,265	1,340	1,415	1,489	1,562	1,635	1,707	1,779	1,851
1,081 1,167 1,253 1,338 1,423 1,508 1,591 1,674 1,757 1,839 1,921 2,002 1,326 1,416 1,506 1,595 1,684 1,771 1,859 1,946 2,032 2,118 1,400 1,496 1,591 1,685 1,778 1,871 1,964 2,055 2,146 2,237 1,477 1,578 1,678 1,777 1,876 1,977 2,079 2,182 2,283 2,385 2,485 1,556 1,662 1,767 1,879 2,078 2,187 2,295 2,402 2,599 2,614	89									1,020	1,101	1,183	1,263	1,343	1,423	1,502	1,580	1,658	1,736	1,812	1,889	1,965
1,326 1,416 1,506 1,595 1,684 1,771 1,859 1,946 2,032 2,118 1,400 1,496 1,591 1,685 1,778 1,871 1,964 2,055 2,146 2,237 1,477 1,578 1,678 1,777 1,876 1,976 2,079 2,182 2,284 2,359 1,556 1,662 1,767 1,876 2,079 2,182 2,283 2,385 2,485 1,556 1,663 1,767 1,877 2,078 2,079 2,182 2,283 2,385 2,485	70									1,081	1,167	1,253	1,338	1,423	1,508	1,591	1,674	1,757	1,839	1,921	2,002	2,082
1,400 1,496 1,591 1,685 1,778 1,817 1,964 2,055 2,146 2,237 1,477 1,877 1,876 1,974 2,071 2,168 2,264 2,359 1,556 1,662 1,767 1,877 1,976 2,079 2,182 2,283 2,385 2,485 1,556 1,662 1,767 1,876 2,079 2,182 2,283 2,385 2,485 1,537 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509 2,614	72											1,326	1,416	1,506	1,595	1,684	1,771	1,859	1,946	2,032	2,118	2,203
1,477 1,578 1,678 1,777 1,876 1,974 2,071 2,168 2,264 2,359 1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,283 2,385 2,485 1,637 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509 2,614	74											1,400	1,496	1,591	1,685	1,778	1,871	1,964	2,055	2,146	2,237	2,327
1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,283 2,385 2,485 1,637 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509 2,614	76											1,477	1,578	1,678	1,777	1,876	1,974	2,071	2,168	2,264	2,359	2,454
1,637 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509 2,614	78											1,556	1,662	1,767	1,872	1,976	2,079	2,182	2,283	2,385	2,485	2,585
	80											1,637	1,748	1,859	1,969	2,078	2,187	2,295	2,402	2,509	2,614	2,719

 $\frac{1}{2}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

	240											4,974	5,401	5,841	6,293	6,756	7,232	7,719	8,219	8,731	9,254	9.790	10,338	10,897	11,469	12,053	12,649	13,256	13,876	14,508	15,151	15,807	16,475	17,155	17,846	18,550	19,266	
	230											4,419	4,815	5,224	5,646	6,080	6,527	6,987	7,459	7,944	8,442	8,952	9,475	10,011	10,560	11,121	11,695	12,281	12,881	13,493	14,117	14,755	15,405	16,067	16,743	17,431	18,132	
	220											3,924	4,292	4,673	5,068	5,476	5,897	6,332	6,779	7,240	7,715	8,202	8,703	9,217	9,745	10,286	10,840	11,407	11,988	12,582	13,189	13,810	14,444	15,091	15,751	16,425	17,112	
	210											3,485	3,828	4,184	4,555	4,939	5,337	5,748	6,174	6,613	7,067	7,534	8,014	8,509	9,017	9,539	10,075	10,625	11,189	11,766	12,357	12,962	13,581	14,214	14,860	15,520	16,194	
	200											3,097	3,417	3,752	4,100	4,463	4,840	5,231	5,637	6,057	6,490	6,939	7,401	7,877	8,368	8,873	9,392	9,926	10,473	11,035	11,611	12,201	12,806	13,425	14,057	14,705	15,366	
	190						1,475	1,702	1,944	2,200	2,471	2,756	3,056	3,371	3,700	4,044	4,402	4,774	5,161	5,563	5,979	6,410	6,855	7,315	7,789	8,278	8,781	9,299	9,832	10,379	10,940	11,516	12,107	12,712	13,331	13,965	14,614	
	180						1,271	1,479	1,702	1,940	2,192	2,459	2,741	3,037	3,349	3,675	4,016	4,371	4,741	5,126	5,526	5,941	6,370	6,814	7,273	7,746	8,234	8,737	9,255	9,787	10,334	10,896	11,473	12,064	12,670	13,291	13,926	
	170						1,096	1,287	1,493	1,714	1,950	2,201	2,466	2,746	3,042	3,352	3,676	4,016	4,371	4,740	5,124	5,523	5,937	6,366	6,809	7,268	7,741	8,229	8,732	9,250	9,783	10,330	10,893	11,470	12,062	12,669	13,290	
	160	288	390	202	639	785	246	1,123	1,314	1,520	1,741	1,977	2,228	2,493	2,773	3,068	3,378	3,703	4,043	4,397	4,766	5,150	5,549	5,963	6,392	6,835	7,294	7,767	8,255	8,758	9,276	9,808	10,356	10,918	11,495	12,087	12,694	
htFeet	150	226	316	420	539	673	821	984	1,162	1,355	1,562	1,784	2,021	2,273	2,539	2,820	3,116	3,426	3,751	4,091	4,446	4,815	5,199 .	5,598	6,012	044,9	6,883	7,341	7,813	8,301	8,803	9,319	9,851	10,397	10,958	11,533	12,124	
Total heightFee	140	177	255	349	457	579	716	867	1,033	1,214	1,408	1,618	1,842	2,080	2,333	2,601	2,883	3,179	3,490	3,815	4,155	4,510	4,879	5,262	2,660	6,073	6,500	6,941	7,398	7,868	8,353	8,853	9,367	9,895	10,438	10,996	11,568	
1	130	137	207	291	389	502	628	769	924	1,093	1,277	1,474	1,686	1,911	2,151	2,405	2,674	2,956	3,253	3,563	3,888	4,228	4,581	4,948	5,330	5,726	6,136	6,560	6,998	7,450	7,917	8,398						
	120	107	169	245	335	439	925	687	832	066	1,163	1,348	1,548	1,761	1,988	2,229	2,483	2,751	3,033	3,329	3,638	3,961	4,297	4,648	5,012	5,389	5,781	6,186	6,605	7,038	7,484	7,944						
	110	*8 	140	210	292	388	964	618	753	901	1,063	1,237	1,424	1,625	1,839	2,066	2,306	2,559	2,825	3,104	3,397	3,702	4,021	4,353	4,698	5,056	5,427											
	100	89	119	182	258	346	944	559	685	823	973	1,135	1,310	1,498	1,698	1,910	2,135	2,372	2,622	2,884	3,158	3,445	3,744	4,056	4,380	4,716	5,065									A		
	90	57	103	161	230	311	404	508	623	751	889	1,040	1,202	1,375	1,561	1,757	1,966	2,186	2,417	2,660	2,915	3,181	3,459	3,748	4,050	4,362	4,686											
	80	20	92	144	207	281	365	7460	995	682	808	946	1,094	1,253	1,422	1,602	1,792	1,993	2,205	2,427	2,660	2,904																
	70	45	83	130	186	253	328	413	508	612	726	849	982	1,125	1,276	1,438	1,609	1,789	1,979	2,179	2,388	2,606																
	09	42	75	116	166	224	290	365	448	539	639	747	863	987	1,120																							
	90	38	99	102	144	193	249	312	382	459	545	633	730																									
	40	33	26	84	118	157	201	251	306	367																												
Diameter breast height	inches 17	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	04	42	44	46	48	50	52	54	56	58	09	62	-64	99	89	70	72	74	76	78	80	

 $\frac{1}{2}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE..-Block indicates extent of data.

	240										4,051	4,384	4,725	5,074	5,430	5,795	6,167	6,547	6,935	7,331	7,735	8,146	8,566	8,993	9,428	9,872	10,322	10,781	11,248	11,723	12,205	12,695	13,193	13,699	14,213	14,735
	230										3,653	3,973	4,303	4,643	4,993	5,352	5,721	660'9		6,885	7,293	7,710	8,136	8,573		9,474	9,940 1	10,414 1	10,899	11,393 1	11,897 1	12,410 1				14,561 1
	220										3,292	3,600	3,920	4,251	4,593	4,946	5,310	5,686	6,072	6,470	6,879	7,299	7,730	8,172	8,625	9,090	9,566	10,052	10,550	11,060	11,580	12,111	12,654	13,207		14,348
	210										2,966	3,263	3,572	3,894	4,227	4,574	4,932	5,303	2,687	6,082	6,491	6,911	7,344	7,789	8,247	8,717	9,199	9,694	10,201	10,721	11,252	11,797	12,353	12,922	13,504	14,097
	200										2,673	2,959	3,257	3,569	3,894	4,233	4,584	4,950	5,328	5,720	6,126	6,544	6,976	7,422	7,881	8,353	8,838	9,337	6,849	10,375	10,914	11,466	12,032	12,611	13,203	13,809
	190					1,255	1,458	1,675	1,906	2,152	2,411	2,685	2,972	3,274	3,590	3,920	4,264	4,622	4,995	5,381	5,782	6,196	6,625	7,068	7,525	7,996	8,481	8,980	9,493	10,021	10,562	11,118	11,688	12,272	12,870	13,482
	180					1,086	1,275	1,478	1,696	1,929	2,177	2,439	2,716	3,007	3,313	3,634	3,969	4,319	4,683	5,062	5,456	5,864	6,287	6,725	7,177	7,644	8,125	8,622	9,132	9,658	10,198	10,752	11,321			13,117
	170					939	1,115	1,306	1,512	1,732	1,968	2,219	2,484	2,765	3,060	3,371	3,696	4,036	4,391	4,761	5,146	_	5,961	6,391	6,836	7,296	7,770	8,260		9,284	9,818	10,367	10,931			12,713
	160	307	411	530	499	813	976	1,155	1,349	1,559	1,783		2,276	2,545	2,829	3,129	3,443	3,772	4,117	4,476		5,240						7,893	8,388	8,897	9,422	9,962				12,272
Feet	150	243	336	444	267	705	857	1,025	1,208	1,405	_	1,845	2,088	2,345	2,618	2,905	3,207	3,525	3,857	4,204	4,566	4,943				6,601	7,053	7,520	-	8,498	9,010	9,536	10,078			11,792
Total heightFeet	140	192	275	373	984	614	756	913	,084	,271	,472	1,687	1,918	2,163	2,423	2,697	2,986		3,609	3,942	4,290	4,653				6,251	6,687	7,138	7,603	8,084	8,579	680,6	9,613 10			11,274
Tot	130	151	226	315	419	537	699	816	1 226	,152	,341	1,545	1,763	1,995 2	2,242 2	2,502 2	2,777 2	3,067 3	3,371 3		4,021					5,896	6,314 6	6,746 7		7,654		01	O1	10	10	=
	120	119	187	569	364	473	596	733	883	1,047	1,224	1,416 1	1,621 1	1,840 1		2,318 2	2,578 2	2,852 3	3,139 3			4,084 4			5,152 5	5,535 5	5,932 6	6,343 6	6,768 7	7,206 7	7,658 8					
	110	96	158	232	320	420	534	199	800	953 1,0	,119 1,		1,489 1,	1,694 1,	1,911 2,0	2,142 2,	2,386 2,	2,643 2,	2,913 3,	3,195 3,	•	3,800 4,			4,805 5,		5,1	, 9	,9	7,	7,					
	100	79	135	203	284	376	481	598	727	898	,022 1,	,187 1,	, 365	,555 1,	,757	,972 2,	,198	,437	,688	,951	,227	,514	814	,126	,450	,786										
	96	68	119	181	255	339	435	542	099	790	931 1	1,083 1	1,246 1	1,421	1,607	1,804 1	2,012 2	2,232 2	2,463 2	2,705 2	2,959 3	3,223	3,499 3	1	4,085 4	4,394 4										
	80	62	108	164	230	307	394	491	599	716	844	982 1	1,130	1,289 1	1,458 1		1,826 2	2,025 2	2,235 2	2,455 2	2,685 2	3	~	3	4	47										
	70	58	66	150	209	278	356	443	539	449	759	882	1,015	1,156	1,307	•		1,814	2,001	2,198	2,403															
	09	55	92	137	190	250	319	395	480	572	672	781	897	1,021																						
	20	53	85	124	170	222	281	346	418	497	583	675																								
	40	22	77	109	147	190	239	293	352																											
Diameter breast height	outside bark inches <u>1</u> /	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	94	84	20	52	54	95	58	09	62	49	99	89	70	72	74	9/	78	80

 $\underline{J'}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Stump and top excluded

Diameter breast height								T	otal hel	ghtFeet							
outside bark inches_	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
											-			-1			
6	3	- la	5	5	6	7	8	9	9	10	11	12	13				
8	5	7	8	10	11	13	14	15	17	18	20	21	22				
10	8	10	13	15	17	20	22	24	26	28	31	33	35				
12	10	14	18	22	25	28	31	35	38	41	44	47	50				
14	13	18	23	28	34	38	43	47	51	56	60	64	68				
16	17	22	28	35	42	49	56	61	67	73	78	84	89				
i= 18	21	27	34	42	50	59	69	78	85	92	99	106	113				
20	26	33	41	50	60	70	81	93	105	113	122	131	140	148	157	. 166	
22	32	40	49	59	70	82	95	108	122	136	148	158	169	180	190	201	
24	38	47	57	69	82	95	110	125	140	157	174	188	201	214	226	239	
26	A4	55	66	79	94	109	125	142	160	178	198	218	236	251	265	280	
₹ 28		64	77	90	107	124	142	161	181	201	223	245	268	291	308	325	
30 ·		74	88	103	120	140	160	181	203	225	249	274	300	326	353	373	393
32		84	101	117	135	156	178	202	226	251	277	304	333	362	392	423	447
34			113	132	151	174	198	224	250	278	307	336	367	399	432	466	501
36			127	148	170	192	219	247	276	306	337	370	403	438	473	510	548
38				165	189	213	241	271	303	335	369	405	441	478	517	557	598
40				183	209	236	263	296	331	366	403	441	480	521	562	605	649
42				202	231	260	289	323	360	398	a 438	479	521	565	610	656	703
44				222	253	285	317	350	390	432	474	518	564	611	659	708	759
46				242	277	312	346	381	422	466	512	559	608	658	709	762	817
48				264	302	339	377	415	455	502	551	602	654	707	762	818	876
50				286	327	368	409	450	491	540	592	646	701	758	816	876	938
52						398	442	487	531	578	634	691	750	811	873	936	1,002
54						429	477	525	573	620	678	738	801	865	931	998	1,067
56						462	513	564	616	667	722	787	853	921	991	1,062	1,135
58						495	550	605	661	716	771	837	907	979	1,052	1,128	1,205
60						530	589	648	707	766	825	889	962	1,038	1,116	1,196	1,277
62									755	818	881	943	1,020	1,100	1,181	1,265	1,351
64									804	871	938	1,005	1,078	1,162	1,249	1,337	1,427
66									855	927	998	1,069	1,140	1,227	1,318	1,410	1,504
68									908	984	1,059	1,135	1,211	1,293	1,388	1,485	1,584
70									962	1,042	1,122	1,203	1,283	1,363	1,461	1,563	1,666
72											1,188	1,272	1,357	1,442	1,535	1,642	1,750
74											1,254	1,344	1,434	1,523	1,613	1,723	1,836
76											1,323	1,418	1,512	1,607	1,701	1,806	1,92
78									٠.,		1,394	1,493	1,593	1,692	1,792	1,891	2,01
80											1,466	1,571	1,676	1,780	1,885	1,990	2,106

 $[\]frac{1}{2}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 17.—Board-foot volume of California red fir by International 1/4-inch rule

Top diameter, 6.5 inches Stump height, 1 foot

Stump and top excluded

Diameter reast height								•	Total hei	ghtFeet							
inches_	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	20
10	38	51	66	84	105	129	157	189	227	269	318	372	433				
12	54	72	92	115	142	173	209	250	296	349	409	477	552				
14	73	95	121	150	184	223	267	317	374	438	511	591	681				
16	94	122	154	191	232	279	332	392	460	536	621	716	822				
18	117	153	192	236	285	341	404	474	554	642	741	851	973				
20	144	187	233	286	344	409	482	564	656	758	871	996	1,135	1,288	1,455	1,638	
22	173	224	279	340	408	483	568	661	766	881	1,010	1,152	1,308	1,479	1,667	1,872	,
24	205	264	329	399	477	564	660	766	884	. 1,014	1,158	1,317	1,491	1,683	1,892	2,119	
26	240	308	382	463	552	650	758	878	1,010	1,155	1,316	1,492	1,686	1,897	2,128	2,379	
28		355	440	532	632	742	864	997	1,144	1,306	1,483	1,678	1,891	2,123	2,376	2,652	
30		406	502	605	718	841	976	1,124	1,286	1,465	1,660	1,873	2,107	2,361	2,637	2,937	3,26
32		460	567	683	809	946	1,095	1,258	1,437	1,632	1,846	2,079	2,333	2,610	2,910	3,235	3,5
34			637	766	905	1,056	1,220	1,400	1,595	1,809	2,041	2,295	2,571	2,870	3,195	3,546	3,9
36			711	853	1,007	1,173	1,353	1,549	1,762	1,994	2,246	2,521	2,819	3,142	3,492	3,870	4,2
38				946	1,114	1,296	1,492	1,705	1,936	2,188	2,461	2,757	3,078	3,425	3,801	4,207	4,6
40				1,043	1,226	1,424	1,638	1,869	2,119	2,390	2,684	3,003	3,347	3,720	4,122	4,556	5,0
42				1,144	1,344	1,559	1,790	2,040	2,310	2,602	2,918	3,259	3,628	4,026	4,456	4,918	5,4
44				1,251	1,468	1,700	1,950	2,219	2,509	2,822	3,160	3,525	3,919	4,344	4,801	5,293	5,8
46				1,362	1,596	1,847	2,116	2,405	2,716	3,051	3,412	3,802	4,221	4,673	5,159	5,681	6,2
48				1,477	1,730	2,000	2,289	2,598	2,931	3,289	3,674	4,088	4,534	5,013	5,528	6,081	6,6
50				1,598	1,870	2,159	2,468	2,799	3,154	3,535	3,945	4,385	4,858	5,365	5,910	6,494	7,1
52				.,,,,,	.,-,-	2,324	2,654	3,007	3,385	3,790	4,225	4,691	5,192	5,729	6,304	6,921	7,5
54						2,495	2,847	3,223	3,624	4,054	4,515	5,008	5,537	6,104	6,710	7,359	8,0
56						2,673	3,047	3,446	3,872	4,327	4,814	5,335	5,893	6,490	7,129	7,811	8,5
58						2,856	3,254	3,677	4,127	4,608	5,123	5,672	6,260	6,888	7,559	8,276	9,0
60						3,045	3,467	3,914	4,391	4,899	5,441	6,019	6,637	7,297	8,001	8,753	9,5
62						,,,,,	3, 10,	3,5	4,662	5,198	5,768	6,376	7,025	7,718	8,456	9,243	10,0
64									4,942	5,505	6,105	6,744	7,424	8,150	8,923	9,746	10,6
66									5,230	5,822	6,451	7,121	7,834	8,593	9,401	10,261	11,1
68									5,526	6,147	6,807	7,509	8,255	9,048	9,892	10,790	11,7
70									5,830	6,481	7,172	7,906	8,686	9,515	10,395	11,331	12,3
72									2,030	0,701	7,172	8,314	9,128	9,993	10,911	11,885	12,9
74											7,931	8,732	9,581	10,482	11,438	12,452	13,5
76											8,324	9,160	10,045	10,983	11,977	13,032	14,1
78											8,727	9,100	10,519	11,495	12,529	13,624	14,7
80											9,139	10,046	11,004	12,019	13,093	14,229	15,4

 $[\]frac{1}{2}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 18.—Board-foot volume of California red fir by Scribner rule in 16-foot logs to a utilized top

Stump and top ex	xcluded	24010														lameter, v p helght,	
Diameter breast height									Total he	ghtFeet							
inches_	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
1.2	24	41	60	81	105	133	164	199	239	284	334	390	452				
14	38	60	84	112	142	177	215	259	308	363	424	491	566				
16	54	82	113	147	185	227	274	327	385	451	523	603	692				
18	74	108	146	187	233	284	340	402	471	548	633	726	828				
20	96	138	183	232	287	346	412	485	565	654	752	859	976	1,105	1,245	1,398	
22	121	171	224	283	346	416	492	576	668	769	880	1,002	1,135	1,280	1,438	1,610	
24	149	207	270	337	411	491	578	674	779	894	1,019	1,156	1,305	1,468	1,644	1,836	
26	179	247	320	397	481	573	672	780	898	1,027	1,167	1,320	1,487	1,667	1,863	2,075	
28		290	373	462	557	661	772	894	1,026	1,169	1,325	1,495	1,679	1,878	2,094	2,327	
30		337	431	532	639	755	880	1,015	1,162	1,321	1,493	1,680	1,882	2,101	2,338	2,593	2,86
32 .		388	494	606	726	855	994	1,144	1,306	1,481	1,671	1,876	2,097	2,336	2,594	2,871	3,170
34			560	685	819	962	1,115	1,281	1,459	1,651	1,858	2,082	2,323	2,583	2,863	3,163	3,48
36			631	770	917	1,075	1,244	1,425	1,620	1,829	2,055	2,298	2,560	2,841	3,144	3,469	3,817
38				859	1,021	1,194	1,379	1,577	1,789	2,017	2,262	2,525	2,808	3,112	3,438	3,787	4,16
40				953	1,131	1,320	1,521	1,737	1,967	2,214	2,479	2,763	3,067	3,394	3,744	4,119	4,52
42				1,051	1,246	1,452	1,671	1,904	2,153	2,420	2,705	3,010	3,338	3,688	4,063	4,464	4,89
44				1,155	1,366	1,590	1,827	2,079	2,348	2,634	2,941	3,269	3,619	3,994	4,394	4,822	5,27
46				1,264	1,493	1,734	1,990	2,261	2,550	2,858	3,187	3,537	3,912	4,312	4,738	5,193	5,678
48				1,377	1,624	1,885	2,160	2,452	2,762	3,091	3,442	3,817	4,216	4,641	5,095	5,578	6,09
50				1,496	1,762	2,042	2,337	2,650	2,981	3,333	3,708	4,106	4,531	4,983	5,464	5,976	6,52
52						2,205	2,521	2,855	3,209	3,584	3,983	4,406	4,857	5,336	5,845	6,387	6,96
54						2,374	2,712	3,069	3,445	3,844	4,268	4,717	5,194	5,701	6,239	6,811	7,418
56						2,550	2,910	3,289	3,690	4,114	4,562	5,038	5,543	6,078	6,646	7,249	7,888
58						2,732	3,115	3,518	3,943	4,392	4,867	5,369	5,902	6,467	7,065	7,700	8,37
60						2,920	3,327	3,754	4,204	4,679	5,181	5,711	6,273	6,867	7,497	8,164	8,870
62									4,474	4,976	5,505	6,064	6,655	7,280	7,941	8,641	9,38
64									4,752	5,281	5,838	6,427	7,048	7,704	8,398	9,132	9,90
66									5,039	5,595	6,182	6,800	7,452	8,140	8,867	9,635	10,44
68									5,333	5,919	6,535	7,184	7,867	8,588	9,349	10,152	11,00
70									5,637	6,252	6,898	7,578	8,294	9,048	9,844	10,683	11,56
72											7,270	7,982	8,731	9,520	10,351	11,226	12,14
74											7,653	8,397	9,180	10,004	10,870	11,783	12,74
76											8,045	8,823	9,640	10,499	11,402	12,353	13,35
78											8,447	9,259	10,111	11,006	11,947	12,936	13,97
80											8,859	9,705	10,593	11,525	12,504	13,532	14,61

 $[\]frac{1}{2}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Stump and top excluded

Diameter reast height								Total he	ightFee	et					
inches 1	40	50	60	70	80	90	100	110	120	130	140	150	160	170	18
,	2	2	l.	1.	4	_	_	. 6	6	→	7	8	8		
6 8	3 5	3	4	4 7	8	5 9	5 9	10	11	7 12	7 13	14	15		
	7	5				14		16	18	19	21	22	24		
10		9	10 I 14	11	12 18		15			28					
12 14	11 14	12	14	16	24	19 26	21	23 32	25	38	30 40	32 43	34 46		
16	19	17 22	19 25	22 28	31	35	29 38	41	35 45	49	53	57	60		
18	24	28		36	40	35 44	48	52	57	62	67	72	76		
			32	44							82	88	94	100	1
20	29	34 42	39		49	54	59	65 78	71 86	77 93	100	107	114	121	1
22 24	42		47	53	59	65 78	71			110			136	144	
		49	57	64	71	· ·		93	102		119	127			1
26	50	58	66	75	83	91	100	110	119	129	139	149	159 185	169	1 2
28		67	77	87	96	106	116	127	139	150	162 186	173	212	196	
30		77	88	99	110	122	133	146	159	172		199		225	2
32		88	100	113	126	138	151	166	181	196	211	226	241	256	2
34			113	128	142	156	170	187	204	221	238	255	272	289	3
36			127	143	159	175	191	210	229	248	267	286	305	324	3
38				159	177	195	213	234	255	276	298	319	340	361	3
40				177	196	216	236	259	283	306	330	353	377	401	Ĺ
42				195	217	238	260	286	312	338	364	390	416	442	Į.
44				214	238	261	285	314	342	371	399	428	456	485	
46				234	260	286	312	343	374	405	436	467	499	530	
48				254	283	311	340	373	407	441	475	509	543	577	
50				276	307	338	368	405	442	479	515	552	589	626	6
52						365	399	438	478	518	557	597	637	677	
54						394	430	472	515	558	601	644	687	730	
56						424	462	508	554	600	647	693	739	785	8
58						454	496	545	594	644	694	743	793	842	8
60						486	531	583	636	689	742	795	848	901	2
62						519	567	623	679	736	793	849	906	962	1,0
64						553	604	664	724	784	844	905	965	1,025	1,0
66						588	642	706	770	834	898	962	1,026	1,091	1,
68									817	885	953	1,021	1,090	1,158	1,2
70									866	938	1,010	1,082	1,155	1,227	1,:
72											1,069	1,145	1,221	1,298	1,
74											1,129	1,210	1,290	1,371	1,
76											1,191	1,276	1,361	1,446	1,5
78											1,254	1,344	1,434	1,523	1,0
80											1,319	1,414	1,508	1,602	1,6

 $[\]frac{1}{2}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 20.—Board-foot volume of incense-cedar by International 1/4-inch rule

Stump and top excluded

Top diameter, 6.5 inches Stump height, 1 foot

Diameter breast height								Total h	elghtFe	et					
outside bark	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
				-0		70			446		.1.				
10	31	40	49	58	68	79	90	102	116	130	145	162	180		
12	45	57	70	84	98	113	130	147	166	187	209	233	259		
14	61	78	95	114	133	154	177	201	227	255	285	317	352		
16	80	102	125	149	174	201	231	262	296	332	372	414	460		
18	101	129	158	188	220	255	292	332	375	421	470	524	582		
20	125	159	195	232	272	315	360	410	462	519	581	647	718	795	877
22	151	192	235	281	329	381	436	496	560	629	703	783	869	962	1,061
24	180	229	280	334	392	453	519	590	666	748	836	932	1,034	1,144	1,263
26	212	269	329	392	460	532	609	692	782	878	982	1,093	1,214	1,343	1,483
28		312	381	455	533	617	707	803	906	1,018	1,138	1,268	1,408	1,558	1,719
30		358	438	522	612	708	811	922	1,041	1,169	1,307	1,456	1,616	1,788	1,974
32		407	498	594	696	806	923	1,049	1,184	1,330	1,487	1,656	1,838	2,035	2,246
34			562	671	786	910	1,042	1,184	1,337	1,501	1,678	1,870	2,075	2,297	2,535
36			630	752	882	1,020	1,168	1,327	1,498	1,683	1,882	2,096	2,327	2,575	2,842
38				838	982	1,136	1,301	1,479	1,670	1,875	2,097	2,335	2,592	2,869	3,167
40				928	1,088	1,259	1,442	1,638	1,850	2,078	2,323	2,588	2,873	3,179	3,509
42				1,024	1,200	1,388	1,590	1,806	2,040	2,291	2,561	2,853	3,167	3,505	3,869
44				1,123	1,317	1,523	1,745	1,983	2,238	2,514	2,811	3,131	3,476	3,847	4,246
46				1,228	1,439	1,665	1,907	2,167	2,447	2,748	3,072	3,422	3,799	4,204	4,641
48				1,337	1,567	1,813	2,076	2,359	2,664	2,992	3,345	3,726	4,136	4,578	5,053
50				1,451	1,700	1,967	2,253	2,560	2,890	3,246	3,630	4,043	4,488	4,967	5,483
52						2,128	2,437	2,769	3,126	3,511	3,926	4,373	4,855	5,373	5,930
54						2,294	2,628	2,986	3,371	3,787	4,234	4,716	5,235	5,794	6,395
56						2,468	2,826	3,211	3,626	4,072	4,553	5,072	5,630	6,231	6,877
58 .						2,647	3,032	3,445	3,889	4,368	4,884	5,441	6,039	6,684	7,377
60						2,833	3,244	3,686	4,162	4,675	5,227	5,822	6,463	7,153	7,895
62						3,025	3,464	3,936	4,444	4,992	5,581	6,217	6,901	7,638	8,430
64						3,223	3,691	4,194	4,736	5,319	5,947	6,624	7,354	8,139	8,983
66						3,428	3,926	4,461	5,036	5,657	6,325	7,045	7,820	8,655	9,553
68									5,346	6,005	6,714	7,478	8,302	9,188	10,141
70									5,665	6,363	7,115	7,925	8,797	9,736	10,746
72											7,527	8,384	9,307	10,300	11,369
74											7,951	8,856	9,831	10,881	12,009
76											8,387	9,341	10,370	11,477	12,667
78											8,834	9,840	10,923	12,089	13,343
80											9,293	10,351	11,490	12,717	14,036

 $[\]frac{17}{2}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE,--Block indicates extent of data.

Table 21.—Board-foot volume of incense-cedar by Scribner rule in 16-foot logs to a utilized top

Top diameter, variable Stump and top excluded Stump height, 1 foot Diameter Total height -- Feet breast height outside bark 40 50 70 90 100 110 120 130 140 150 170 180 33 46 66 73 80 86 12 27 40 53 60 93 99 106 42 63 74 84 116 147 158 168 14 53 95 105 126 137 61 76 91 106 122 137 152 167 182 198 213 228 243 16 18 83 103 124 145 165 186 207 227 248 269 289 310 331 189 485 108 162 216 242 269 404 431 458 20 135 296 323 350 377 22 136 170 204 238 272 306 340 374 408 442 476 510 544 578 612 24 167 251 377 419 460 502 544 586 628 670 712 754 209 293 335 354 404 455 505 707 758 808 859 26 202 253 303 556 606 657 909 28 300 360 420 480 540 600 660 720 780 839 899 959 1,019 1,079 842 983 1,053 1,193 1,264 30 351 421 491 562 632 702 772 913 1,123 812 894 1,219 1,381 1,462 32 406 487 569 650 731 975 1.056 1.137 1,300 1,024 1,210 1,582 1,675 34 558 651 745 838 931 1.117 1,303 1,396 1,489 740 846 951 1,057 1,163 1,268 1,374 1,480 1,585 1,691 1,797 1,903 36 634 38 834 953 1,072 1,191 1,310 1,429 1,548 1,668 1,787 1,906 2,025 2,144 2,133 2,400 1,200 1,333 1,467 1,600 1,733 1,867 2,000 2,267 40 933 1,067 2,670 42 1,038 1,187 1,335 1,483 1,632 1,780 1,928 2,077 2,225 2,373 2,522 44 1,149 1,313 1,477 1,641 1,806 1,970 2,134 2,298 2,462 2,626 2,790 2,955 1,446 1,807 2,711 2,892 3,253 46 1.265 1.627 1,988 2,169 2,350 2,530 3,073 1,981 3,368 2,774 2,972 3,566 48 1,387 1,585 1,783 2,179 2,378 2,576 3,170 1,514 2,163 2,596 2,812 3,028 3,245 3,461 3,677 3,894 50 1,731 1,947 2,379 4,235 52 2.118 2.353 2,588 2,824 3,059 3,294 3,529 3,765 4,000 3,826 4,336 4,081 4,591 2,806 3,316 54 2,296 2,551 3,061 3,571 4,686 4,962 2,481 2,756 3,032 3,308 3,583 3,859 4,135 4,410 56 58 2,673 2,970 3,267 3,564 3,861 4,158 4,455 4,752 5,049 5,346 4,149 4,787 5,426 5,745 3,830 4,468 5,107 60 2,872 3,192 3,511 5,816 6,158 4,790 5,474 3,421 3,763 4,105 4,448 5,132 62 3,079 64 3,659 4,025 4,390 4,756 5,122 5,488 5,854 6,220 6,586 3,293 5,466 5,856 6,247 6,637 7,027 66 3,514 3,904 4,294 4,685 5.075 5,820 6,236 7,068 7,483 4,989 5,405 6.652 68 5,303 5,744 6,186 6,628 7,070 7,512 7,954 70 7,032 8,438 72 6,563 7,501 7,970 7,448 7,944 8,441 8,937 74 6,951 8,926 76 7,351 7,876 8,401 9,451 78 7,761 8,315 8,870 9,424 9,978 8,182 8,767 9,351 9,936 10,520 80

 $\frac{1}{2}$ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 22-Root mean squared errors of form factor equations

0			Root mean	squared error		
Species	Cul	bic	Internation	nal 1/4-Inch	Scrib	ner
	Ratio	Percent	Ratio	Percent	Ratio	Percent
Douglas-fir	0.04	11.7	0.31	14.8	0.32	17.3
Ponderosa and Jeffrey pine	.05	13.4	.40	17.6	.41	20.9
Sugar pine	.05	15.5	. 44	19.3	. 45	21.7
Lodgepole pine	.04	10.9	.32	13.6	. 33	16.6
White fir	.04	13.2	. 37	17.0	. 36	18.9
California red fir	.04	13.5	.38	18.0	. 38	20.3
Incense-cedar	.04	14.6	.31	19.0	.29	21.6

Table 23—Results of a test of study equations and the old local volume tables against 441 trees of known volume from the Stanislaus National Forest

Species and log rule	Mean volume per tree	Root mean squ	ared error 1/	Aggregate difference				
		Study equations	Old local volume tables	Study equations	Old local volume tables			
Douglas-fir (15 trees):								
Cubic International 1/4-inch Scribner	114.6 780.6 677.1	19.2 24.9 31.1	27.7 51.0 48.1	10.1 9.1 10.7	-0.5 -8.3 -1.2			
Ponderosa and Jeffrey pine (146 trees):					4			
Cubic International 1/4-inch Scribner	158.9 1,120.1 1,009.2	20.2 26.9 29.5	31.7 56.7 49.5	4.6 2.0 3.4	-8.5 -17.0 -13.3			
Sugar pine (34 trees):								
Cubic International 1/4-inch Scribner	214.5 1,546.5 1,417.6	13.0 17.6 43.0	20.8 32.1 38.0	-5.2 -10.3 -9.9	-6.7 -13.9 -10.9			
Lodgepole pine (60 trees):								
Cubic International 1/4-inch Scribner	79.0 457.2 411.6	15.8 25.4 30.0	50.5 60.0 77.4	3.8 7.9 4.7	35.0 36.2 41.0			
White fir (86 trees):								
Cubic International 1/4-inch Scribner	168.3 1,197.6 1,096.7	15.7 21.4 38.1	22.4 31.2 52.4	-6.2 -9.7 -9.8	-10.8 -15.0 -12.5			
California red fir (42 trees):								
Cubic International 1/4-inch Scribner	284.9 2,044.0 1,892.6	17.2 24.8 28.1	28.3 33.4 27.4	-2.6 -10.2 -10.7	1 -5.2 -2.5			
Incense-cedar (58 trees):								
Cubic International 1/4-inch Scribner	117.3 769.9 679.4	20.5 28.1 51.7	39.2 52.8 65.7	6 -2.5 -5.0	-20.7 -23.1 -17.9			
Combined (441 trees):								
Cubic International 1/4-inch Scribner	159.2 1,108.1 1,005.9	17.9 24.9 34.8	32.9 47.5 43.8	3 -3.8 -3.9	-5.4 -11.6 -8.1			

 $[\]frac{1}{2}$ Logarithmic transformation was used to equalize variance.

Table 24—Comparative reliability of diameter-height and diameter-height-form class volume equations in estimating Stanislaus National Forest sample tree volumes

(In percent)

Equation	Cubic		International 1/4-inch		Scribner	
	Root mean 1/	Aggregate difference	Root mean 1/squared error1/	Aggregate difference	Root mean squared error1/	Aggregate difference
Without form class	16.2	-0.6	20.1	-4.5	23.3	-4.4
With actual form class	12.0	5.4	13.0	1.7	16.3	1.7
With average form class	16.2	-1.8	20.5	-5.7	23.7	-5.5

 $[\]frac{1}{2}$ In order to equalize variance, root mean squared errors were calculated for four factors instead of volume.

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